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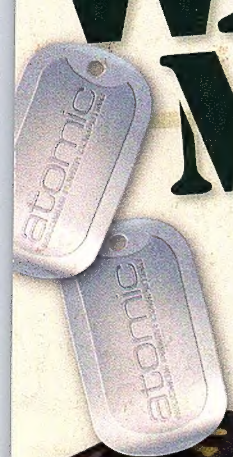

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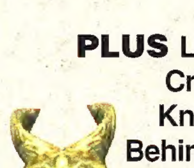

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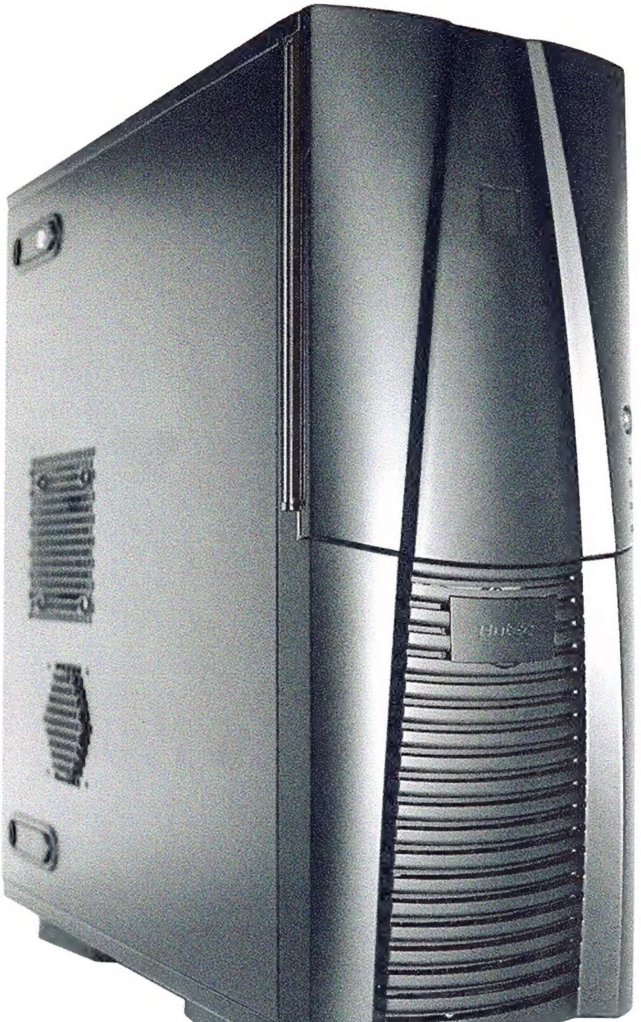

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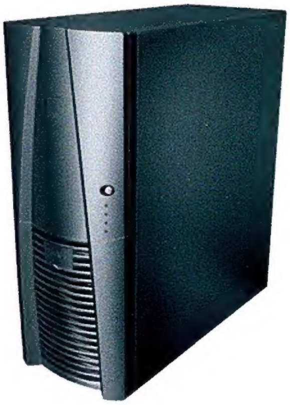

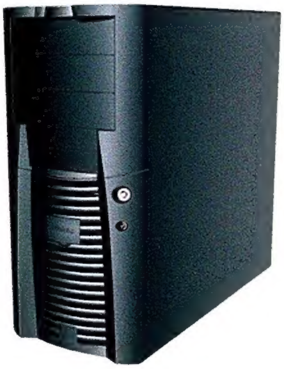

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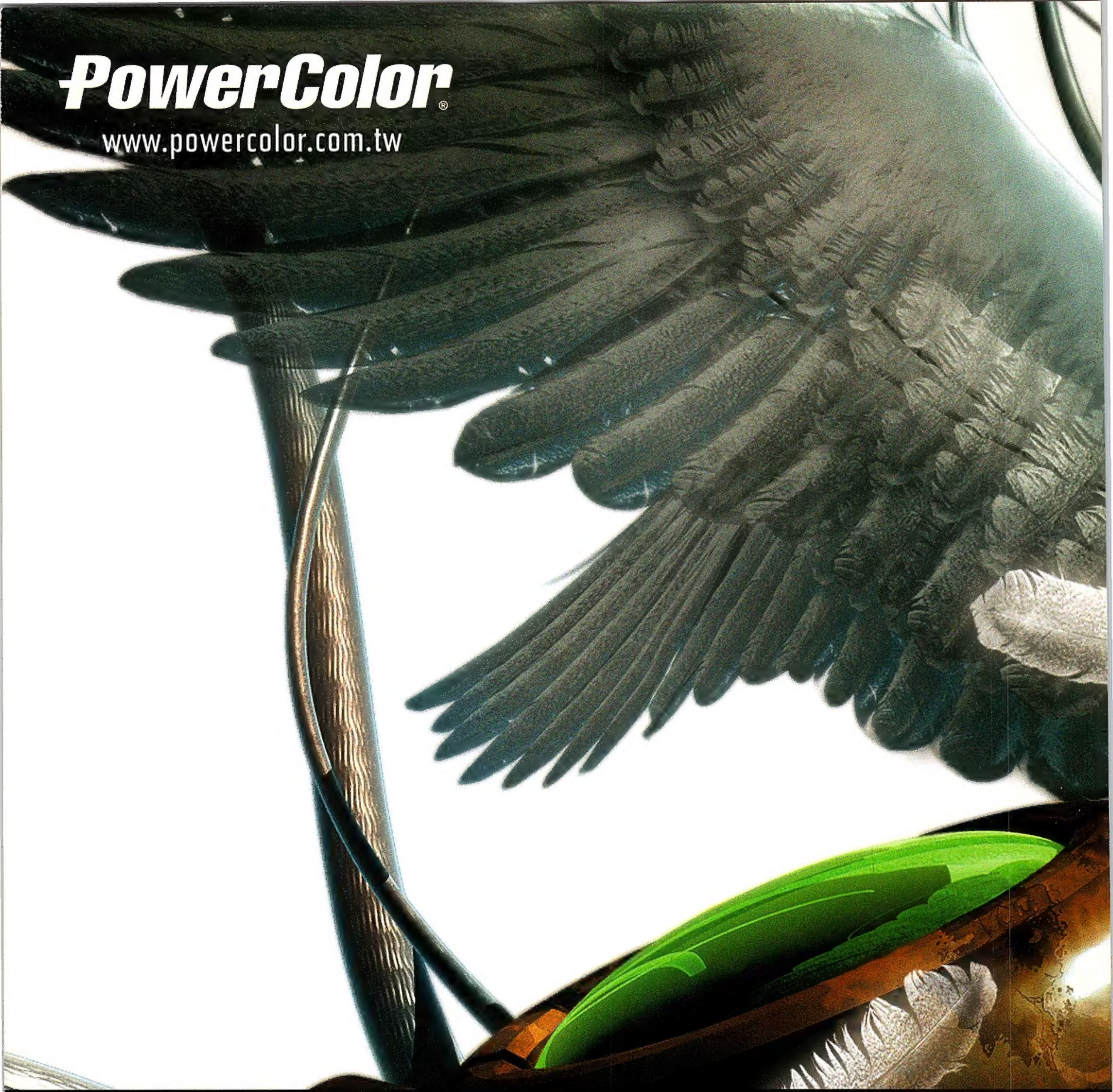

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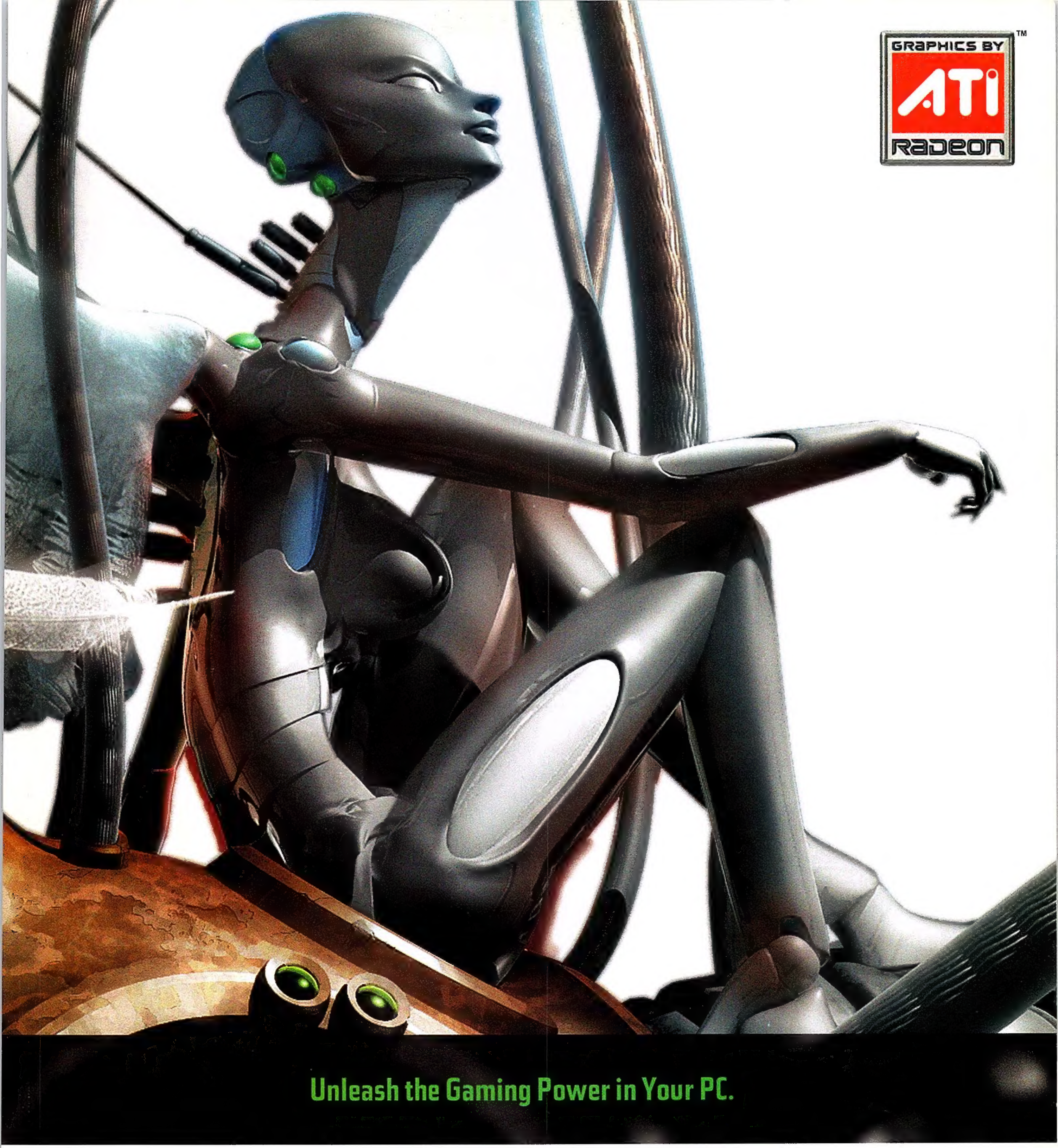

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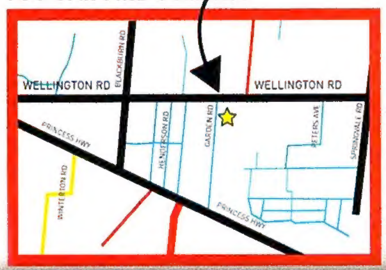

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Technogentsia

This is why I love this job. I get to work with an elite team of tech specialists, trained in the arts of building, hacking, optimising, and *experimenting* (read: doing all the things to hardware your mother always warned you about). Because that's what we are, and that's what we do.

And we have some of the best talent in the industry here to do it. Even so, occasionally I call on a select band of agents, each a master in their own right. When it came to discovering just how tough machines have to be to survive the rumble of a tank, the coldest ends of the Earth, or the far reaches of space I sent out an encoded message to Simon Sharwood to retrieve the real story. And he did a fantastic job, as you can see on *page 48*. It's beautiful.

But I digress – the response to our Issue 50 milestone has been *massive*. We all worked like monkeys on crack to deliver something special, and I think we did. Words are not adequate to the task of expressing the fantastic feedback we received, so I'll just say thanks, and let you know there's plenty more to come. Really, we're only just *beginning*.

Starting with expanding *Atomic's* online content, in line with the grand master plan. Ben Mansill is the architect behind it, so you know it's going to be good. Better than good, in fact.

But more importantly you'll note that *Atomic* is now $7.95, and fatter to boot – we've heard your call for more *Atomic* goodness every month, and we're delivering. From this issue onwards *Atomic* is now 24 pages larger than the standard book size last year, and larger even than when it first began. It's the dawn of a new *Atomic* age, with more of everything that makes us passionate about tech. Here's to the next 50 issues!

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amills@atomicmpc.com.au

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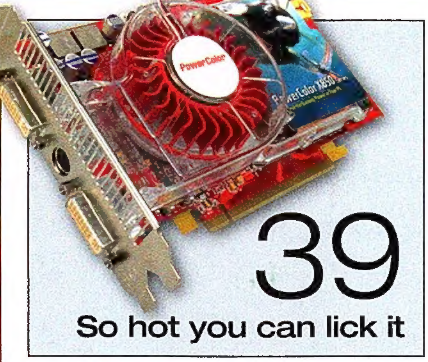
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The Atomic Collection

Welcome to the *Atomic* Collection Part 2!

Every now and then the universe turns and a monumental event occurs – sliced bread is invented, mankind lands on the moon, or, as was the case just over four years ago, a magazine to lead all others is born. Out of the firey passion for power and speed, *Atomic* was forged for all.

But what happens if you missed one of these events? How can you catch up on history in the making, and be a part of the revolution? No problem! We can't help you with sliced bread, or anything even remotely related to space travel, but we can give you all the *Atomic* issues ever made up to this shining star.

And so, you will find on this month's cover CD Part 2 of the *Atomic* Collection, containing issues 26-50 – yes, right up to last month's issue – in the super-cool DjVu format. If you bought last month's issue that included issues 1-25 then you now have a complete collection of Australia's best technology magazine.

How good is that?

As with last month's installment, these files are the original *Atomic* source, the blueprints in all their glory, page by page and issue by issue.

So browse the CD, read in-depth tech features, complete hardcore wacko tutorials, share the joy of sensational reviews, and see just how we got to where we are today and to the magazines you hold in your hands right here, right now.

Enjoy!

The *Atomic* Team

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...if you were a *Star Wars* character, who would you be?

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Editorial and product submission: *Atomic* welcomes all information on new and upgraded products and services for possible editorial coverage. However, we respectfully point out that the magazine is not obliged to either review or return unsolicited products. The Editor welcomes ideas for articles, preferably sent in outline form, with details of the author's background and a few samples of previously published work. We cannot accept responsibility for unsolicited copy and stress that it may take some time for a reply relating to these submissions to be sent out. Artomic: All submissions must be the original work of the person submitting, and submitted works become the property of Haymarket Media.

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shortcircuits

Lasers for everybody!

Some wacky scientists over at Intel have made interesting progress in the area of silicon photonics – that is using silicon to create lasers and such – so much so they consider it a breakthrough. Making use of the 'Raman' effect, Intel researchers have created a continuous beam of laser light using plain old CPU-grade silicon. What this means is cheaper, easier to make lasers for all sorts of tasks, including use inside of conventional processors.

A little rusty on the 1337 speak? Who isn't? Luckily for us, Microsoft has taken the liberty of providing all those un-hip parents of the world -- along with the rest of us who though the days of 'r0x0r' were blue and bloated at the bottom of Lake Lamer -- with an informative guide on the finer points of calling your camping opponent a goat-blowing hussy in Counter-Strike: **www.microsoft.com/athome/security/children/kidtalk.mspx**

AMD is busting into the super mobile processor market. The new range of CPUs, called Alchemy, will compete with Intel's XScale series. The biggest selling point for Alchemy is its on-die transcoding capabilities for WMV, DivX and MPEG 4 and its support for DDR. The 400MHz Au1200 also draws just 400mW of power, which would be awesome if a 600MHz XScale didn't consume 500mW, but it does. Good thing megahertz aren't the benchmark these days.

SHA-boom!

Collision on Hash street

By now, most would have heard of the trouble brewing in the heart of encryption city. Recently, a group of researchers at Shandong University in China managed to write an algorithm that created collisions in SHA-1 after 2^69 hash operations, as opposed to the average 2^80 operations using brute force. A collision is basically when two different input strings undergo the same hash function and produce the same result.

While the difference between 2^69 and 2^80 may not seem like much to the unlearned eye, it's actually 2,000 times faster. For your average hacker, this really doesn't change much -- according to sources, a machine capable of finding a collision in SHA-1 within 56 hours would cost something to the tune of US$38 million. But this is just a collision. To 'crack' SHA-1 for any practical purpose would require a specific set of circumstances that in reality would never happen.

What's getting everyone wound up is that, potentially, this could allow malicious users to send a file or use a password that would pass SHA-1 verification even if it was incorrect.

Although of concern, the amount of hype it has caused at other news outlets is frankly totally whack. The pace at which the computational power of PCs is increasing means that any hash-based function used for encryption – MD5, Blowfish and even SHA-256 and SHA-512 – will come under threat eventually in the decades to come. In fact, collisions were found in MD5 years ago, and every hash function that has input larger than its digest – the number of characters that make up the end hash string – will have collisions. This is simple maths.

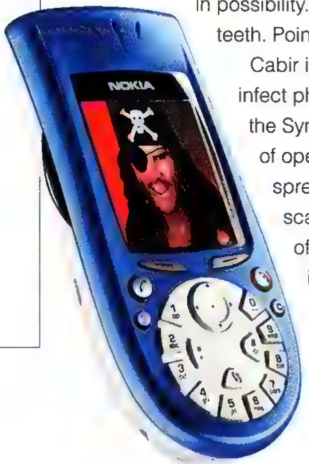
All this does is give the cause to adopt more complex hashing functions -- something which is already in motion – a little push. So yes, let's migrate away from SHA-1, but heck, there's no need to scare people.

Guess that's media for you.

Cabir phones home

Viruses only stay proof-of-concept for so long...

We reported on the Cabir mobile phone virus a few months back, the worm receiving special mention in our *Cyber psychosis* feature in *Issue 43*. At the time, it was proof-of-concept – a harmless experiment in possibility. Well, now it has teeth. Pointy ones.



Cabir is designed to infect phones running the Symbian 60 series of operating system. It spreads via Bluetooth, scanning the locals of the phone it has infected for targets. In doing so, it rapidly drains the battery on the phone. This was the extent of its damage.

Now, a more virulent virus based on Cabir, called Lasco, not only spreads in a similar fashion to Cabir, it also infects other files as well. Like any good worm, it inserts loading data into the header of executable files – in this case those with an SIS extension – in order to improve its rate of infection.

Fortunately, Cabir/Lasco can only infect Bluetooth phones in discovery mode, and even if your phone is infected, neither virus does anything destructive or irreparable. Additionally, the user must confirm the installation of the virus, making it that much harder to contract, especially for the cautious or security-aware.

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PC User TOP PRODUCT 2004

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That familiar sound

Logan Booker welcomes the return of Sensaura and its kooky bag of tricks.

The basic multimedia experience is composed of two parts: audio for listening and video for watching. While equally important, they are not equally treated and our perceptions are driven primarily by what we see, even if such perceptions are subtly influenced by other senses.

When it comes to PCs, home entertainment setups and mobile devices, the reality is people like pictures and make do with stereo sound because they presume, wrongly, that two speakers is enough. Like all things however, sound is a complex concept, and our unique ability to perceive minute changes in pitch, depth, volume and distance makes replicating the experience digitally a lot more involving than pumping sound out of a basic two-piece speaker set with an oversized subwoofer.

Gaming for instance provides an audio engineer with perhaps the most daunting task they could ever encounter – creating the illusion of 3D sound with just two speakers. Simply put, you can't do it without a little sleight of hand. Hence, we have technologies such as Dolby Pro Logic and Creative EAX.

This is all good and well for hi-fi and PC enthusiasts, but for those with a passion for mobile devices, there's not much in the way of 3D audio. Such capabilities are lost in the race to improve battery life, display clarity and connectivity.

Leave it to a bunch of ex-Sensaura guys to provide mobile 3D audio with some much needed loving.

The Sensaura legacy

Founded back in May 2003 by four of Sensaura's former directors (Sensaura was acquired by Creative in 2004) Sonaptic set out to nurture 3D audio in a market that had neglected it. Among the four was Dr Alastair Sibbald, the main man behind much of Sensaura's audio technologies. Dr Sibbald has written numerous technical papers on the science of sound, including head-related transform functions (HRTF) and the virtualisation of audio through headphones.

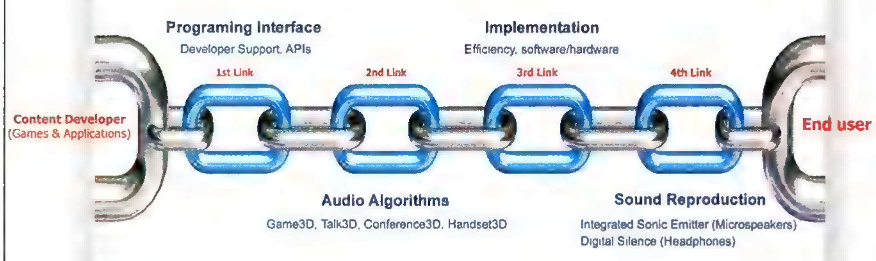
Although Sonaptic is a relatively new company, Dr Sibbald and the rest of the Sensaura directors have almost 12 years of experience working with digital soundscapes, having developed software such as GameCODA – an advanced multi-platform audio middleware solution for game developers.

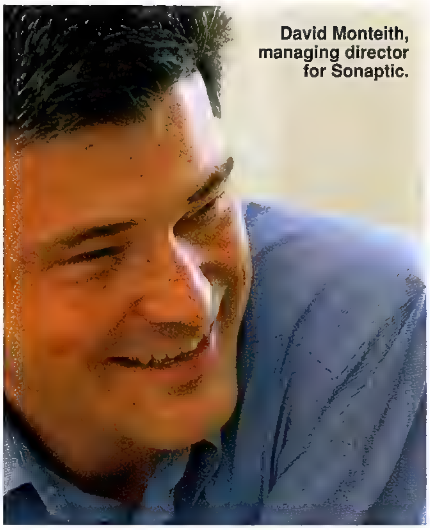
The 'Sonaptic 3D Audio Engine' is the result of their combined expertise.

According to Rebecca Woolley, Sonaptic's business development manager, the tech has already been licensed to Fujitsu, Mitsubishi and NEC for use in their mobile devices.

'Sonaptic technology is very flexible. We can provide a software-only solution for handset vendors which can be split on processors as required by the handset

The Sonaptic 3D Audio Engine consists of many parts, all of which are outlined in the diagram below.





David Monteith, managing director for Sonaptic.

Dr Alastair Sibbald was one of the driving forces behind many of Sensaura's audio technologies.

> **Sonaptic set out to nurture 3D audio in a market that had neglected it.**

manufacturer. Sonaptic supports all platforms and has implementations on two of the industry's leading platforms,' says Woolley.

Although the technology is predominately software, Sonaptic provides a consultancy service for vendors to help customise their hardware for the Audio Engine.

Science of sound

Sonaptic claims that the technology works regardless of whether the device uses microspeakers or headphones. One of the primary issues with replicating sound naturally is the environment in which the sound is occurring. While not a significant issue for users with headphone, it is a concern for those without.

'The technology is of a very high standard and although there is always a sweet spot with 3D audio this is not so significant when using the Sonaptic 3D Audio Engine,' explains Woolley.

'The louder the background noise the harder it is to hear, as with any audio, however the 3D effect [of the Audio Engine] is not significantly diminished.'

Sonaptic also boasts that the Audio Engine is capable of producing a flat frequency response when coupled with the right speakers – or at least close to it. What this means is that the Audio Engine produces accurate sound regardless of its frequency, which is important when simulating 3D audio.

Predictably, the technology is based on reverberation, like Creative's EAX, and not reflection. According to a technical whitepaper from Sonaptic on the technology: 'Our 3D-sound synthesis is devoid of sound reflections: it is an anechoic [echoless] simulation. In reality, however, waves arrive at the listener from a sound-emitting object via many different routes: a direct path, scattered paths and many reflected paths.'

Tracing all the reflections of a sound is computationally expensive and, while more realistic, is unnecessary for an application such as a game – especially when processing power is at a premium.

'These effects can be re-created in the Sonaptic 3D Audio Engine using 3D reverberation; a complex network of time-delay and filter elements coupled to an array of "virtual loudspeakers" around the listener,' the whitepaper says.

Audio party

So, Sensaura is reborn with Sonaptic. Even if the target market is somewhat different, the technology is the same. Regardless, Woolley asserts that Sonaptic won't tackle old ground by venturing back into the world of consumer-level sound cards.

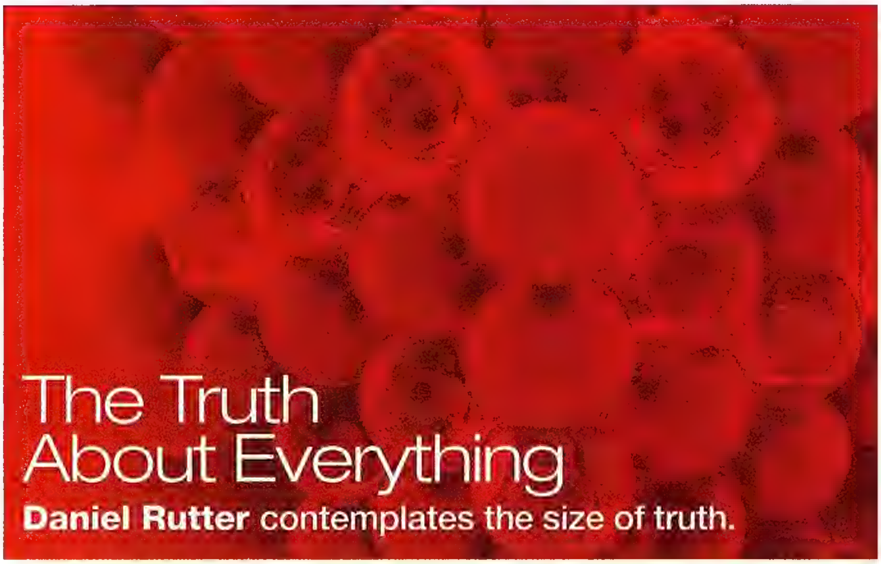
'As Sonaptic already has experience in the sound card market, it is very unlikely that this would be a commercial route. However other consumer devices such as MP3 players and portable gaming devices could be a future target,' she says.

Is there a risk of history repeating itself is Sonaptic's products prove too lucrative?

Woolley doesn't rule it out.

'As a growing and innovative business Sonaptic could be the target for a number of organisations for acquisition, we are however a privately-owned company,' she admits.

In addition to buying Sensaura, Creative also acquired Aureal3D back in 2000. These two purchases removed all competition for Creative in the area of 3D audio technology. Let's hope Sonaptic can inject some freshness into a market that really needs it.



The Truth About Everything

Daniel Rutter contemplates the size of truth.

I don't know what turns the conversation took in the schoolyard between you and your nerdy friends (I'm assuming you had nerdy friends – oh, you were all rugby team captains, were you? Sorry), but I and a number of my compatriots in early teen social hopelessness independently came up with the idea of the Truth Machine.

You have this huge computer with awesomely hypergigantic amounts of storage, and monstrous input and output bandwidth, and processing power to burn, right? And you feed it all human knowledge. Maybe you just let it chew through the Library of Congress, or something, but it's more fun if you also put public input booths all over the place, so anybody can drop in and tell the machine stuff.

> **You have this huge computer with awesomely hypergigantic amounts of storage, and monstrous input and output bandwidth.**

(It was always booths for my schoolfriends and I, not internet input, 'cos FidoNet and CompuServe were pretty much where it was at in consumer connectivity at the time.)

Anyway, every actual statement about the world the computer receives goes into the Truth About Everything database, where it's weighed up against everything that everybody else has ever told the machine. Then, after enough yottabytes of data have been piled up, you can go into one of the booths and ask a question, and the computer will do the relational database lookup to end all relational database lookups, and give you the best answer human knowledge can generate.

Computers like this, and their techno-theological implications, are a staple of the late Golden Age of sci-fi. They always had to be at least a mile on a side.

(Most fans think of Asimov's *The Last Question* from 1956 as being the canonical example, but they're often actually thinking of Fredric Brown's short-short *Answer* from two years earlier. Geek-lit digression concludes.)

It took me another couple of years of goofing off at school before I found the fatal flaw in the Truth Machine idea. That flaw is that database searches, even with the best will and the craftiest algorithms in the world, do not take only twice as long when you have twice as much data to sift. They don't necessarily take four times as long – that's where the crafty coding comes in – but you're still talking about some level of geometric growth in search times.

This means that very large databases with very large amounts of relational interconnectedness – which a Truth Machine's memory will, inescapably, have – take a long time to search. A whole-of-human-knowledge kind of database will take an unreasonably long time to search. Like, a large number of times the age of the universe, for each query, even if your fairy godmother has magically cluster-linked all of the planet's current computing power into one smoothly running ultracomputer for you.

This is analogous to the chess computer problem. The best modern chess programs, running on not-terribly-expensive hardware, are now playing at strong grandmaster level – and getting better. But the 'perfect' chess computer, that just knows every possible game and simply picks moves that lead down the possible-game tree towards it winning, cannot exist. Well, not until we come up with computers that have a lot more bits of memory than there are particles in the universe, anyway.

Wouldn't you know it, though – maybe we are going to make that kind of computer.

As regular *Atomic* readers know, quantum computers are still at, in transistor terms, the Bell-Labs-in-1947 stage. They're not going to be useful for anything for some time. Quantum computers are, currently, way more powerful if you emulate them on a desktop PC.

Once we've got proper quantum hardware, though, the unglamorous but ubiquitous world of databases will be turned upside down. It's been known since 1996 that a working quantum computer will be able to do database searches not in an amount of time governed by the number of records put to some power, but in an amount of time proportional to the square root of the number of records.

This makes a big, big difference. It's even better than twice as many records taking twice as long to search. Twice as many records will, ideally, take only 1.4 times as long.

The '50s writers tended to assume that know-it-all megacomputers would immediately achieve sentience, and a dangerously high opinion of themselves, when you turned them on. Quantum computers, I'm afraid, do not promise to be this entertaining.

With more and more poorly correlated information swamping the world every day, though, what quantum database searching does offer is almost as much fun.

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Lexicon 2000XP

What's in a name? A whole lot of arse, if **Ben Mansill** is doing the talking.

Words are awesome. Good for so many things, it's words and pressed shirts that separate us from the beasts. And words are hardly set in stone. We can muck around with them, change them to mean new things, combine them and make up all-new ones.

Here, at the cutting face of the technology wedge, driving through society like a machete through a pavlova, words are buzzing. We're lucky like that. You and me and the whole cool crowd. Living in the future, as we do. Not only do we get toys-to-die-for served up on a platter, but we also get to shape the Way Things Are for ordinary, less sophisticated folk.

> **Photoshopping is also just wrong. Adobe should pay us five cents every time we say it.**

Now, there have always been colloquialisms, always will be, cobber. And yeah, it's probably true that language shapes thought patterns – and vice versa. So it's as natural as swimming in the buff that we geekgensia are taking the world by the hand and helping it across Communication Road.

Because we're into technology, we're smarter than normal people. Heaps smarter, probably. Benevolently, we use those smarts to help less fortunate intellects get by. We don't do it because we care, we do it for karma points, just in case God does exist. And a part of that big responsibility is helping normal people get their thick heads around stuff that isn't very explainery. We do it by giving them words.

They're into it, too. Dumb people usually know they're dumb, and wear that stigma as a badge of honour as much as a cry for help. They call themselves *noobs*, because we tell them to. When (not 'if') they screw up, they get *flamed*. Unless they're wearing a *flame-retardant suit* (there's no such thing, but we tell 'em there is, cos it's easier to teach a monkey dangerous tricks if they think there's a safety net).

It's already somewhat rooted. Billions of noobs around the world think that any kind of portable music player is an iPod. The change is upon us. Sometimes it's nice, sometimes ugly.

We think it's neat that everyone is Googling. Such a funky word. It wouldn't have mattered what the company was selling, Google was always going to be a winner. Texting is one of our shames. Stupid bloody word. The cringe is worst still with blogging, and peaks with podcasting. What the hell sort of wannabe cutesy word is that? Ridiculous. Photoshopping is also just wrong. Adobe should pay us five cents every time we say it.

Big hits are words we've given that carry a self-contained meaning. So much so, in fact, that common folk have abused our gifts. These days, the process for getting pretty much anything is *downloading*. Unless you're cool, in which case it's *leeching*. Huge difference.

Thanks to us and our kind, people don't mail anymore, they *message*. Well of course they're all messaging, it just doesn't sound very romantic. Where's the style? Too many of these new words are fuxxored. Had a great success lately? Well, you've been *slashdotted*. Pork baloney. I don't want to be Slashdotted, I wanna lay down a *monsterkill!* Don't like it? Go get Tubgirled, ya tard.

But we need to work harder at this. We need to create a legacy that future generations will thank us for. Technology isn't going away. Not on my shift. It's time to act. If we leave it too late, the momentum will be too great to change, even for role-modelling, trend-setters like us power-geeks.

It'll be easy. Just make some stuff up! Next time you see someone from Sales struggling with some bit of technology (not Outlook or their mobiles – Sales are actually more skilled at those than us, but don't worry about it), go up to them, point to whatever they're fiddling with, and explain that they need to Fuzzmah their Cockengirdle. Then show them how, and be creative about it. Have some fun, and send them on their happy way. That very night, they will tell their mates, straightfaced, that they should recalibrate their Nobulator to prevent cheesy gak custardisation.

It'll be great! We'll have ourselves a ripsnorting world where all the words are arsepoundingly boobrific. So kick it all up a notch and make yourself a moniker. Coin a phrase. Do it for the kids of tomorrow, save them from a dark world of podcasted blogs and give them the righteous munting that they so thoroughly deserve.

Want your own word with Ben? Get emailing.
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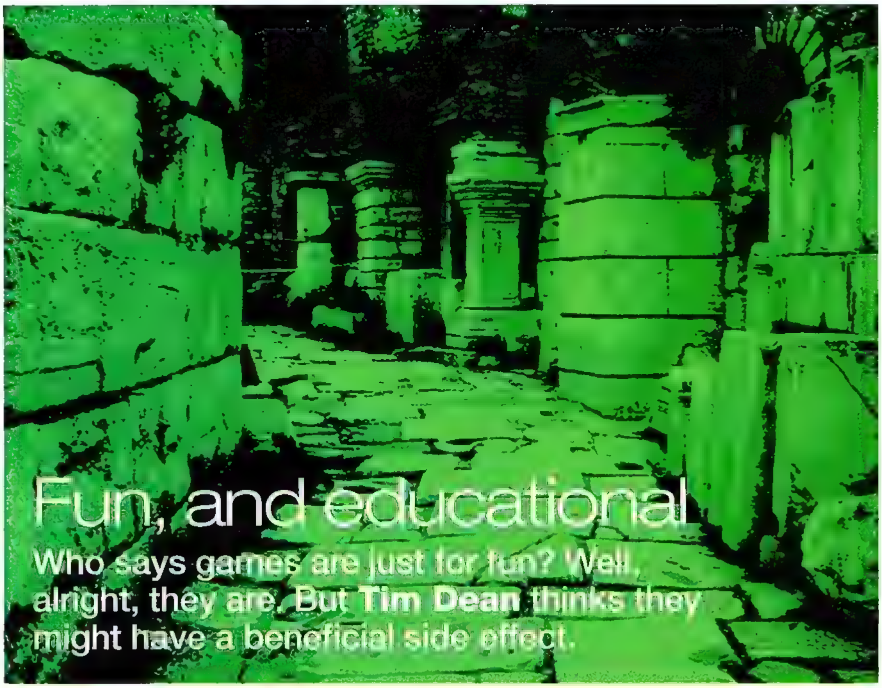

Fun, and educational

Who says games are just for fun? Well, alright, they are. But **Tim Dean** thinks they might have a beneficial side effect.

So, I was invading Cisalpine Gaul the other day, and it got me wondering. Fighting a war on two fronts is never easy, and I was starting to second guess my decision to take on the Gallic tribes and the Dacians to the north of Greece at the same time. The Gauls were tough and stubborn fighters, but their disunity and lack of discipline would be their downfall – they could never stand against the coherent might of the Legions marching their way.

> **It's not easy to milk a horse. You have to stick a straw up its arse and blow to make the teats appear, and that's just the start of the procedure.**

The Dacians were similar in nature, and would be a welcome break from the tight-packed phalanxes of spearmen found in Macedonia. The only remarkable feature of the Dacians was the unusual recurve-bladed two-handed weapon wielded with particular ferocity by a few of their tribes – but nothing a Legionary shield wall couldn't cope with.

But then came the dilemma that inevitably faces every aspiring empire – who's next? You know the story: conquer one nation, and there are two more on their border eyeing you in that shady barbaric way. To the north of the Gauls were the Germanic tribes. Tough buggers, but their deep forests and heavy winters should at least slow them down if they should choose to defy the might of the Empire. To the north of the Dacians though, are the Scythians, living in the lands surrounding the Black Sea – known these days as Ukraine – and they're an entirely different story.

These nomadic tribes live for war. War, and horses. A Scythian rider will drink the blood of their first kill as a right of passage. They scalp their victims and wear their skin like handkerchiefs as a sign of status in their tribe. They're even known to flay an entire enemy and use their hide as a cloak, or as a cover for their quivers. In fact, if a Scythian tribesman doesn't make a kill during a given year, they're left out of their main annual ceremony, where warriors drink wine from the gilded skulls of their enemies. The Scythians were also known as the only race to consume horse milk. And it's not easy to milk a horse. You have to stick a straw up its arse and blow to make the teats appear, and that's just the start of the procedure.

Now, my Legions are tough as nails, and unmatched in infantry combat, but when you're faced with hundreds of half-naked, screaming barbarians on horseback, peppering your ranks with black arrows, and never coming in range of sword or pilum, it can be a touch unnerving. Maybe I should invade Asia Minor first…

Still, there is one thing above all others I have gained from playing Rome: Total War, and that's an even deeper respect for history. After playing for a few nights, I was hunting my bookshelves for anything penned pre-1st century AD. The insights into Scythian culture above, for example, come from Herodotus' *The Histories*, which is a rambunctious collection of anecdotes, hearsay and myth rolled into one of this planet's first history books. I can't recommend it enough.

There are plenty of other things I've learned from gaming too, not just the disposition of Hannibal's ranks as they crossed the Alps. In the west we have a somewhat distorted picture of the Second World War. Thanks to an English language history, and the limitless 'creativity' (*cough* U-571 *cough*) of Hollywood, we're lead to believe that the Western Front, mid-1944 to 1945, was the crescendo of the conflict, and swung the balance of the war towards the forces of good. In fact, while the Western Front was hugely significant in winning the war, the tide had already turned, and the Third Reich's fate was already sealed well before the invasion of Normandy.

The people who broke the back of the Nazi war machine were the poor conscripted Russian peasants, who gave their lives by the millions in the bitter Russian winter to prevent the fall of Stalingrad, or who beat the Wehrmacht at its own blitzkrieg game at Kursk. If it wasn't for games like Close Combat III: The Russian Front, or Combat Mission 2: Barbarossa to Berlin, I may have quietly passed by this area of history.

Sure, I wouldn't recommend that you use games as the basis for all your historical learning – if that were the case it would be easy to wonder why we can't find orc bones at archaeological dig sites. But to dismiss games as a medium that can only engage and entertain, but never inform, would be equally naïve.

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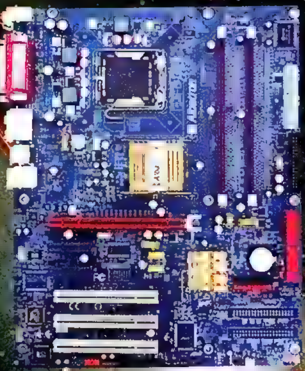

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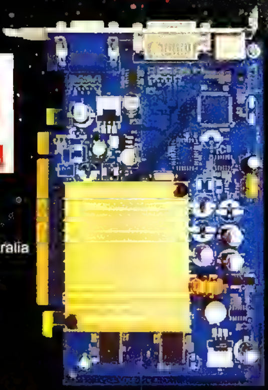

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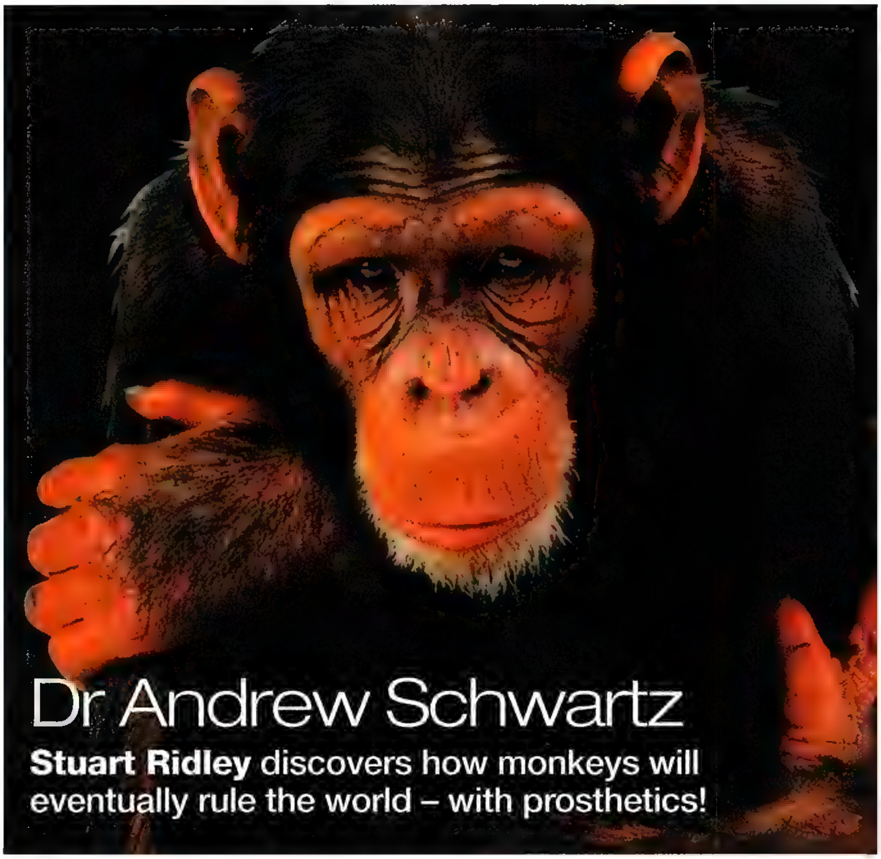


Dr Andrew Schwartz

Stuart Ridley discovers how monkeys will eventually rule the world – with prosthetics!

A monkey wired up with tiny hair-width electrodes connecting its brain to a powerful robotic arm is able to feed itself with the extra limb just by 'thinking' about the arm moving. We caught up with Dr Andrew Schwartz, the scientist heading up this monkey robot mind control experiment, and asked how long it'll be before we can play Counter-Strike by thought alone.

Atomic: How exactly does the monkey use thought-control to work the biomechanical arm? And apart from thinking about banana mash – how does it feel about this?

Dr Andrew Schwartz: The monkeys won't do this task unless they're really happy and comfortable doing it. When the monkey wants to move its arm, cells are activated in the motor cortex. Each of those cells activates at a different intensity depending on the direction the monkey intends to move its arm. The direction that produces the greatest intensity is that cell's preferred direction.

The average of the preferred directions of all of the activated cells is called the population vector. We can use the population vector to accurately predict the velocity and direction of normal arm movement, and in the case of this particular prosthetic, it serves as the control signal to convey the monkey's intention to the prosthetic arm.

Atomic: What is your grand plan for this technology?

Dr Andrew Schwartz: We hope to move to human subjects in two to four years. The beneficiaries of such technology will be patients with spinal cord injuries or nervous system disorders such as amyotrophic lateral sclerosis. It's pretty obvious that what works well in monkeys would work even better in humans.

Every time there is a technological advance, we can use it to better understand the goings-on in the brain.

Atomic: So what needs to happen to these bionic arms before there will be a real market for them among people who have lost the use of limbs?

Dr Andrew Schwartz: Our real goal is not to just make a robot arm move, but to make it move in a natural way – say an amputee was using this device and had a long-sleeve shirt on. The fact that he had a motorised artificial arm wouldn't be noticeable.

atomicbio

Name	**Andrew Schwartz, Ph.D.,**
Occupation	**Professor of Neurobiology at the University of Pittsburgh School of Medicine and senior researcher on the monkey robot arm project.**
Website	**www.medschool.pitt.edu**

Dr. Andrew Schwartz has had an academic interest in spinal cord injury since his college freshman year. Schwartz began working in a neurosurgery lab and did an Honour project on the subject.

In the same lab as a graduate student, he worked on motor control – the area of interest of his thesis advisor – and became interested in 'the volitional control of the arm' – with another professor in the department. Schwartz says he learned a lot about the motor cortex as this was the subject of one of his preliminary exam questions and eventually, he decided to do post-doc work in motor cortex/arm movement.

While there, the team Schwartz was part of made some fundamental discoveries and he has been following up on some of these ever since.

Atomic: On your work page, you say that the monkeys participating in your research can move a ball in a 3D virtual environment 'rapidly and accurately to novel targets' – we're guessing it's either a ball-rolling puzzle (perhaps like Nintendo Super Monkey Ball) or a target game where they 'throw' balls at targets. What is the aim of the game – and what do the monkeys need to master to be 'good' at it?

Dr Andrew Schwartz: The VR task is designed to test 3D directionality. This is a major parameter that cells in motor cortex encode. One of the tasks performed in this space is the 3D centre-to-out task: the monkey starts with its hand in the middle of a cube and reaches to one of the eight corners. This tests eight evenly spaced directions of movement.

Cell activity – frequency of action potential firing – is recorded as the animal performs the task. From this, we can find each cell's directional tuning function, including its 'preferred direction'.

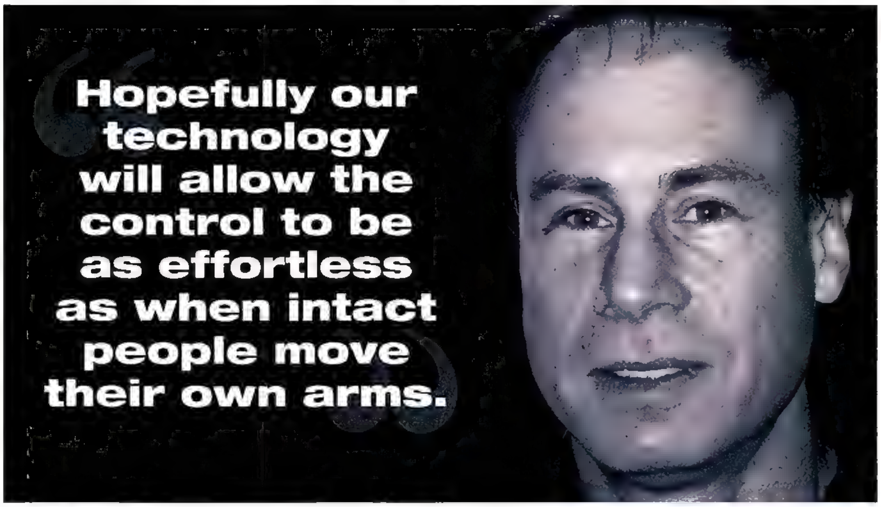
Once we know that we can look at a population of cells recorded with our microelectrodes and use an extraction algorithm to predict the instantaneous direction and speed of the hand.

The required accuracy is controlled by the target and cursor size we display on the screen. The animal has to touch the cursor ball to the target ball in order to be successful. We generally work with a one to two centimetre accuracy. We also require the animal to move faster to the target and to hold on longer once the target is reached.

Atomic: What kinds of training programs do the monkeys participate in? And what kinds of controls were built in so that you could test particular movements?
Dr Andrew Schwartz: We start the animals in the VR task and make the targets large and close together so that it is easy to touch them. Then we make them smaller and farther apart. After they are proficient in the VR using their arm to move the cursor, we restrain their arm and they move the cursor by thinking. We initially make the task easy to do but they get the idea in a day or two and over the next several weeks we increase the difficulty. After they are proficient with brain control in VR, we introduce them to the robot arm. When working with the robot arm, we first have them operate it in a straight line by pulling a joystick. This brings the robot arm, loaded with a piece of food, to the mouth – this gives them the idea of what they are need to do. This takes a couple of days. Then we start with the food-loaded gripper near the mouth and the robot controlled by the brain signal. They don't have to move it far to get a reward. Then we move it farther away ... We start out with 1D control (straight line) then 2D in a sagitaal plane and finally full 3D control where they reach and retrieve food from arbitrary locations.

Atomic: What are some of the issues your team has faced in this research?
Dr Andrew Schwartz: Monkeys have trouble operating a real robot arm. They don't understand the issue of tool use. When we began training the first time we loaded the arm with a juicy orange. Instead of moving the arm to the face, the monkey tried to move its face to the arm. The brain signal was directed away from the animal, so the arm moved away from the animal. This was pretty frustrating.

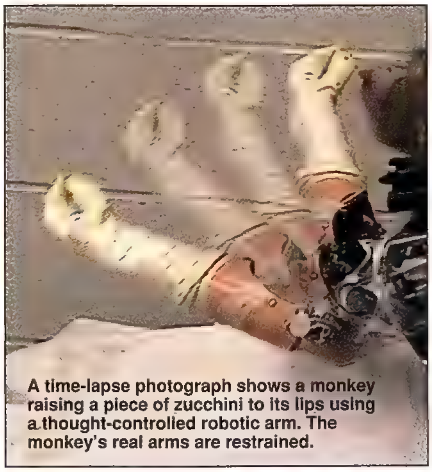
More servos that you can poke a rotary solenoid at.


> Hopefully our technology will allow the control to be as effortless as when intact people move their own arms.

Atomic: Even for humans who have lost the use of limbs it's a fairly big evolutionary step up from current technology – such as a head mouse. Something like that can only really be used for low-input-demand applications, though that includes some hypermedia (web/DVD/CD-ROM etc), browsing and even turn-based strategy games, but that's mostly only on two planes of movement…
Dr Andrew Schwartz: That technology requires unnatural control and most people don't use if for long. Hopefully our technology will allow the control to be as effortless as when intact people move their own arms.

Atomic: OK. So what are the technical issues – bio/mechanical/software etc – you must consider to enhance the efficiency, speed and accuracy of the biomechanical arm movement so that it can be used for intense quick reflex activities – such as playing fast action computer games?
Dr Andrew Schwartz: There is no real technical issue here. This just depends on how well the subject can control the device. The speed is governed by a proportionality constant between the neural output and the generated velocity vector. If it's set too high the system becomes unstable and can be difficult to control.

The real issue comes in trying to generate other types of control, ie. for the hand and fingers. This appendage is much more complex than the proximal arm – 22 degrees of freedom versus four. Also, there is the issue of force control during grasping, which is isometric, and thus not amenable to visual feedback as nothing is moving. This is the next problem we are tackling.


A time-lapse photograph shows a monkey raising a piece of zucchini to its lips using a thought-controlled robotic arm. The monkey's real arms are restrained.

probing the future

Schwartz's team is now working on evolving the technology from a two-pronged gripper, which he says 'moves much like your own arm would move', to a more lifelike hand with independently moving fingers and much greater freedom and accuracy of movement – and to do this, they anticipate they'll need to connect electrodes to an extra 50 or 100 more neurons (the existing robotic arm is operated via 96 electrodes).

Now that sounds like a lot of serious neural wiring, but if the technique works it could deliver a radical upgrade to prosthetic arms for people who have lost the use of a limb.

The biggest hurdle to this technology improving the lives of thousands of humans is the problem of the probes wearing out fairly quickly. The electrodes in the monkeys only lasted six months, as biomatter formed over them. The search is on for more biocompatible materials or even a tiny wireless transmitter for implantation into the brain.

ASUS DVD Burners enable 16X Burning with 8X Discs

Although DVD burning technology has progressed to 16X, the supply of disc media supporting this new high-speed standard remains low. Even if you are one of the lucky few that is in possession of these expensive discs, you still have to worry about burning reliability unless you want a stack of overpriced coasters.

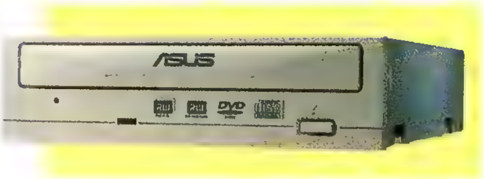
Optical drive makers, of course, won't let their technological advancements go to waste. Take ASUS for example, the company introduced an innovative feature called "Over-Speed Burning". This feature enables users to enjoy fast 16X burning with 8X discs, which are more readily available and more affordable. It's a cost-effective way to shorten burning time.

Double burning speed on dual-layer disks

Over-Speed Burning also supports double-layer discs, which offer large data capacity up to 8.5GB, roughly 2,000 MP3 songs. Most double-layer discs at the moment support 2.4X speed, meaning to burn a full disc takes approximately 40 to 50 minutes. 4X discs are available as well, but higher speed also comes with higher price. With Over-Speed Burning, you can burn an 8.5GB, 2.4X double-layer disc in only 26 minutes.

Disc quality detection for best burning speed

The advantages of Over-Speed Burning are pretty obvious. The one thing you need to pay special attention to is disc quality. Please make sure you purchase discs approved by the manufacturer of your drive. ASUS implement a mechanism for disc quality detection and intelligently adjust for the most suitable burning speeds to prevent poor quality and damaged discs.



In conclusion, if you know what to look for, enjoying the fastest burning speed doesn't necessarily have to mean emptying your wallet. DVD burners with Over Speed Burning are excellent solutions as the shortage of 16X and 4X dual-layer discs continue and these discs remain expensive.

Double layer burning comparison

Disc media	Burning speed	Burning time	Good	Bad
2.4X	2.4X	40-50 min	· Disc is easily attainable · Affordable	Long burning time
4X	4X	26 min	· Short burning time	Supply is low Very expensive
2.4X	Over Speed at 4X	26 min	· Disc is easily attainable · Affordable · Short burning time	High-quality discs needed

---

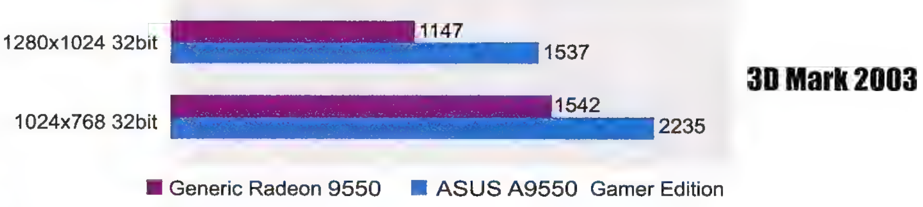
The Choice of Expert Gamers

ASUS Gamer Edition Cards Deliver Big Bang for the Buck

The launch of new titles such as Lineage II and Doom 3 should propel a wave of system upgrades among serious gamers, since more powerful video performance is needed to smoothly run the latest 3D games. Taking into account that many gamers probably don't have huge budgets to enhance their gaming systems, ASUS, a leading provider of graphics solutions, recently introduced special Gamer Edition video cards, which offer explosive graphics at affordable prices.

Improved circuitry and memory modules

Gamer Edition cards, as the name suggests, are specifically tailored towards keen gamers. Gamer Edition cards have redesigned circuit boards, upgraded memory specifications along with other extra features. Compared with solutions supporting the same graphics core, ASUS Gamer Edition cards deliver superior video performance.



For example, the ASUS A9550 Gamer Edition (supporting ATI's Radeon 9550 chipset) provides a 25% performance increase compared with typical Radeon 9550-based graphics cards. And the ASUS V9250 Gamer Edition (supporting Nvidia's FX5200 chipset) is 50% more powerful than other FX5200 solutions.

Same performance using lower-end graphics core

It takes strong engineering to be able to redesign the reference card. The ASUS V9999 Gamer Edition runs on Nvidia's 6800 chipset, but the card's performance actually approaches those supporting the next-level chipset, the 6800GT.

With higher-end memory, the prices of Gamer Edition cards are slightly higher than solutions using the same graphics core, but enable far better video capability. ASUS Gamer Edition is currently the choice of many gaming experts and users who demand top-of-the-line visual effects. Give a little more and you'll get back so much more.

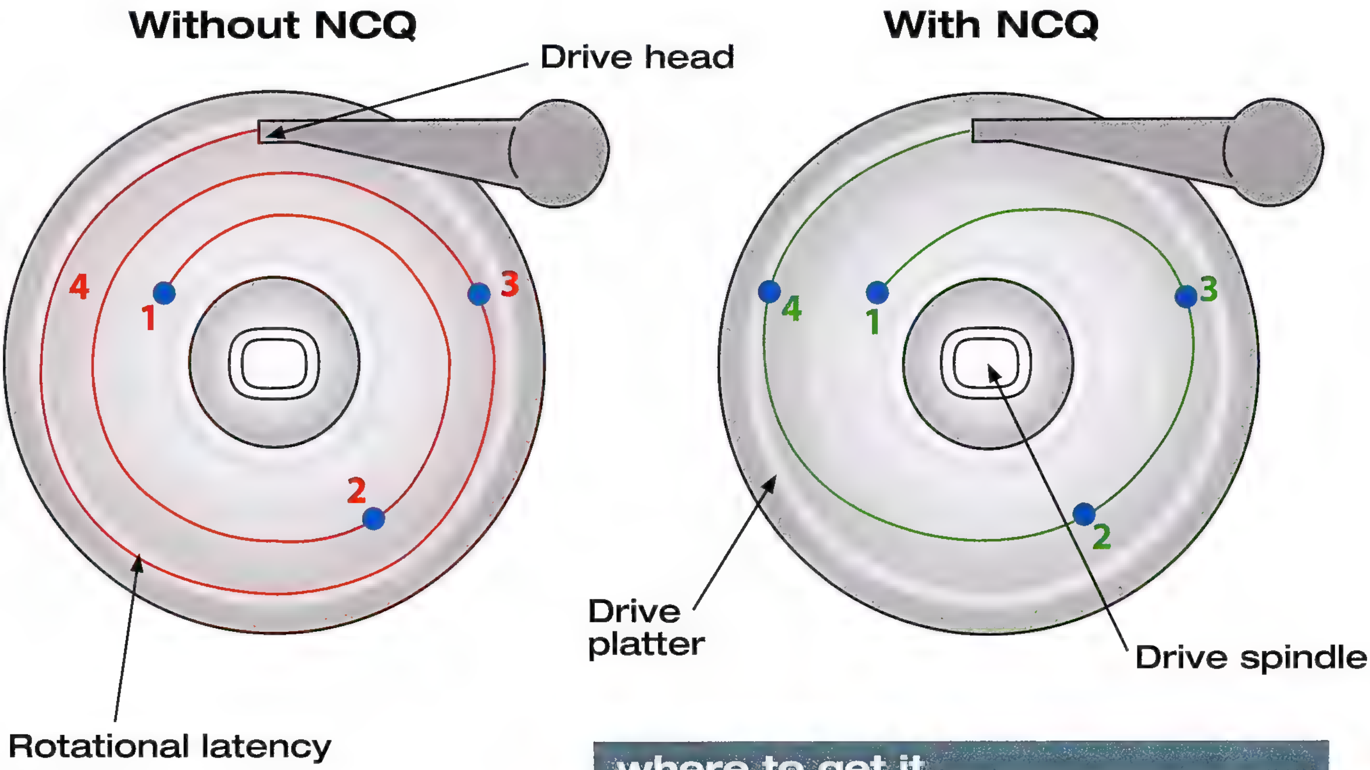
Inside Native Command Queuing

There's more to hard drive speed than raw RPMs, as NCQ will demonstrate.

Just when you thought RPM and interfaces were the only ways to improve hard drive performance, the boffins who design the SATA specification came up with a nifty means of optimising hard drive performance. Called NCQ, or *Native Command Queuing*, the technology has actually been around for some time in another form with SCSI, where it's called *Tagged Command Queueing*. In short, NCQ allows a drive to optimise the positioning of the drive heads to garner faster transfers, especially for lots of random accesses, such as with multi-user systems. Even desktop machines can benefit however, and as we know free speed is always good speed!

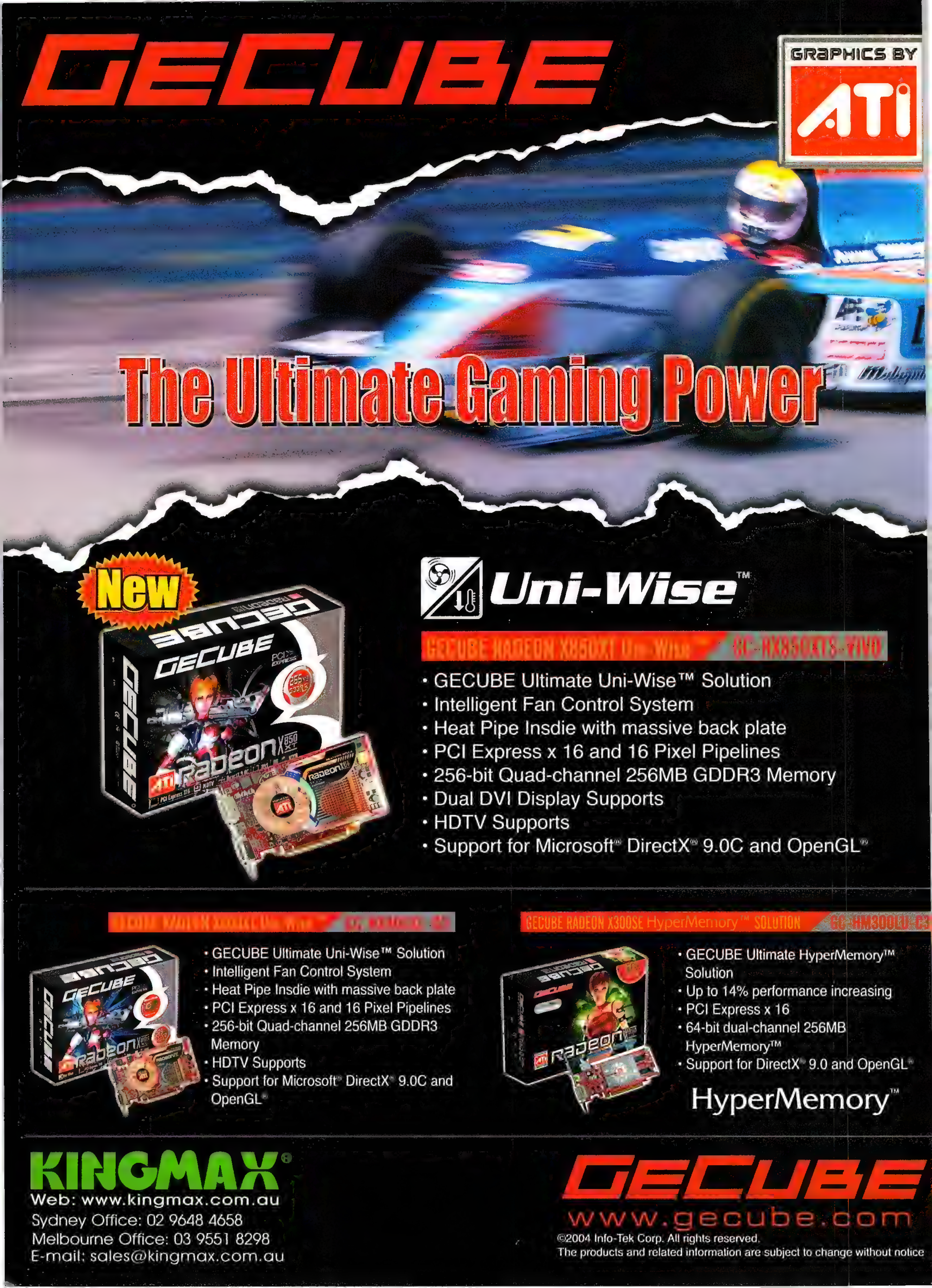
how it works

When a drive reads or writes data it usually processes the commands it receives sequentially. If the information is spread across the disk, the drive heads will jump across the disk in order to process the data. With NCQ, however, commands are dynamically and intelligently re-ordered to minimise head movement, optimising both the seek (time to position the heads) and rotational (time spent waiting for the correct track to pass under the heads) latencies. The popular example for picturing this is an elevator which goes to each floor you press in the order you press them, compared to an elevator which goes to the next nearest floor regardless of the order they were requested. The latter is an optimal use of the elevators time, spending less time travelling and more time arriving! A side benefit of this for NCQ drives is that reduced head movements not only increase performance, but also longevity of the drive head assembly. Note that, by its very nature, NCQ will benefit environments more with multiple simultaneous I/O requests, such as a server systems, though heavily loaded desktop machines can also see an improvement.



where to get it

NCQ is part of the SATA II specification, but has already made it into more recent SATA implementations of both drives and chipsets – which is important, because both the drive and the controller chipset must support NCQ for it to work. Seagate's Barracuda 7200.8 NCQ and Maxtor's DiamondMax 10 are two such drives with NCQ support, while motherboard chipsets such as the nForce 4 support NCQ in the SATA controller.



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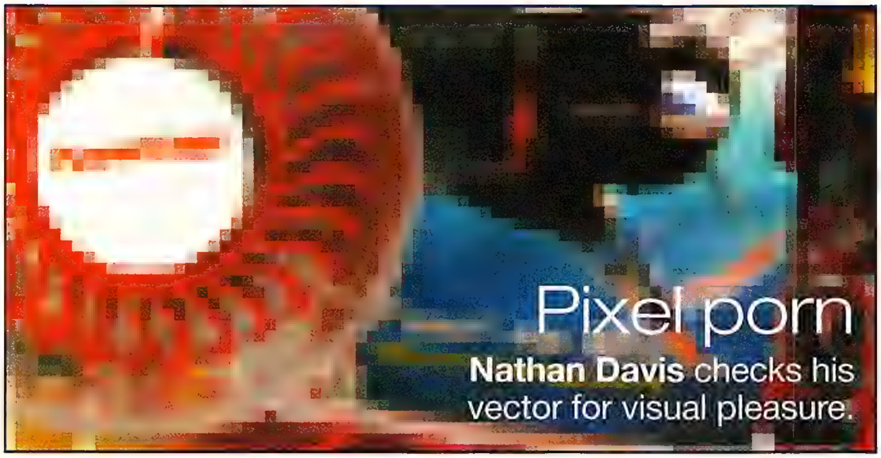

Pixel porn

Nathan Davis checks his vector for visual pleasure.

Have you ever looked at an object, like a pancake for example, and thought 'dang, that has some bad aliasing'? Probably not, but being the insane geek I am, this happened recently. Again.

To eliminate problems like this, but more so in the digital world, the technique of antialiasing was developed to combat the rising problem of displaying graphics designed for high-end machines with high resolutions on lower-specced machines.

With the beastly cards of today, the jaggies have become much less of a problem. Playing games at maxed out resolutions is now a possibility, and the bottleneck is no longer the resolution; rather, the physical limitations of monitors such as dot pitch and pixel counts are preventing further levels of detail.

Love it or hate it, antialiasing is slowly fading into oblivion, possibly never to return. Seemingly like my eyes.

There's a new technology on the horizon that will require processor-saving calculations. Like antialiasing, but better. Only dreamed about in sci-fi movies (though still a fair way off), I am referring to holographic displays. With such displays, detail levels are far less limited to a finite count of pixels. Forget HDTV.

Apparently a group have figured out how to use air molecules as a display platform – these guys: **www.io2technology.com**. It's still a 2D image, but this is a potentially awesome leap ahead. We're yet to determine its legitimacy, but would be damn cool if real. It'd be sex. So we're on it like rabbits.

With true 3D holography, when drawing a 3D object in our three-dimensional world, one can't easily take shortcuts to save computing power. Antialiasing wouldn't really help in this situation. Every angle needs to be accounted for. In a bid to lower the immensely increased processing requirements, it's plausible vector-based graphics will instead come to the rescue.

Right, now back to boring reality!

Nathan doesn't know about the birds and bees!
nath@atomicmpc.com.au

hardcorecontents

Tech Trends 28
Acquiring new raw data, the Atomic Spy Ring unravels IBM's Cell and finds NVIDIA getting dirty with Intel.

Gearbox 30
Playing with the latest widgets, we fiddle with USB vacuum cleaners and pills that make you see 'other' things. Legally.

Head to Head 34
Rounding up the latest wireless mouses, we give them a thorough driving and let you know which is the bee's knees.

Framerate 37
Frames with a rate tend to flog those without. Like boring portraits. Keeping you in the loop on the latest cards.

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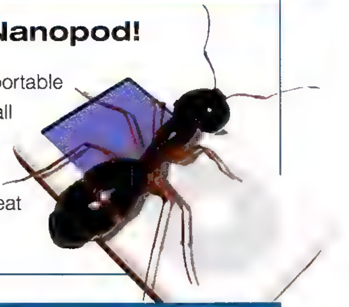
PowerColor X850 XT PE 43
Apple Mac Mini 43
Thermaltake Big Typhoon 44
Arctic Cooling Freezer 4 44
Dell Axim x50v 46
Creative Zen Micro 46

oddware

Apple iNanopod!



The future of portable music. So small you can stick it your ear!
Note: Do not eat iNanopod.

howwetest

Atomic Labs uses components that are chosen to minimise bottlenecks and satisfy our stringent testing procedures. This can be quite dynamic considering the changing marketplace, however we look for longevity in components. All systems use Windows XP Professional SP1 with DirectX 9.0c alongside the latest drivers. Thanks to ASUS, Western Digital and Altech for supplying our testing components.

The bench boxes

'Gigantor'
CPU: AMD Athlon 64 3200+
Motherboard: ASUS K8V Deluxe

'Peewee'
CPU: Intel Pentium 4 3.6GHz EE
Motherboard: Intel 925XE reference

Shared gear

Video card: ASUS RADEON 9800XT
Hard drives: 36GB Western Digital 10,000rpm Raptor SATA drives
RAM: Corsair matched dual-channel DDR RAM (DDR 3200 and DDR2)
Power supply: Antec TruePower 550W EPS PSU

The benchmarks

AquaMark3
AquaMark3 proves its worth via its Pixel Performance test that benchmarks how many pixels a card can process.

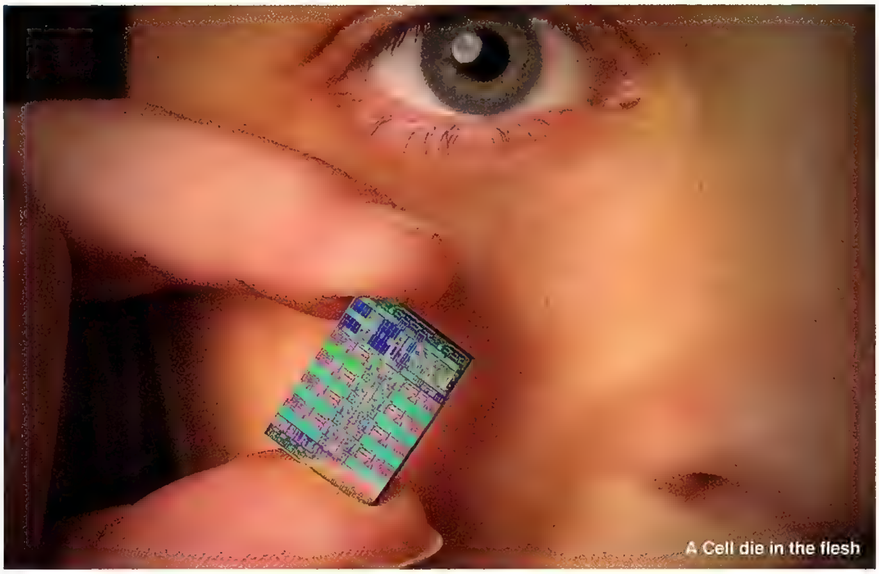
3DMark05 + 3DMark03
3DMark03 and 3DMark05 remain the defintive comparative standard of synethetic game benchmarking.

FarCry
FarCry is particularly useful for its extensive and stressful use of vertex and pixel shaders.

Doom 3
Doom 3 puts the strain on with its broad use of pixel shaders. Its support for 512MB cards provides forward-looking results.

Tech Trends

Bennett Ring reports on Cell's hyped debut, Intel gets on with NVIDIA behind AMD's back, and also discovers a cooler CPU building block.



A Cell die in the flesh

Cell your soul!

The end of PC gaming is nigh. Repent now silicon sinners, as your chosen platform for virtual wickedness is headed for the abyss! Well, that's what the harbingers of the Cell chip would have you believe. With the next generation of console hardware powered by this processor on the near horizon comes a new wave of doomed PC predictions. Finally we've now got some solid information on the Cell processor architecture, and while it actually sounds pretty spiffy, if the past is anything to go by the PC has nothing to fear.

It was at the recent International Solid-State Circuits Conference that IBM, Toshiba and Sony released the first real data on this processor's architecture, along with a healthy dose of hype. According to Dac Pham, one of the engineers involved in the development of this new wunder chip, Cell will be capable of a '10X performance (increase) over the PC, at the same power envelope'. He would say that, wouldn't he?

As far as specifications go, a few new tidbits were floated at the conference. The initial version of the chip will contain 234 million transistors, fabricated on a 90 nanometer process (double the transistor count of a high end P4). It ticks by at around 4.6GHz, and the heart of the processor shares many similarities with a 64-bit PowerPC, but with eight SIMD Processing Units tacked on to it. It's designed to work exclusively with XDR memory from everybody's favourite memory company, RAMBUS.

It's going to be a toasty little blighter, running at a room-warming 85C, so cooling it should be an interesting proposition. The inclusion of memory protection, which only allows the system to allocate memory access and not the OS, should make it less vulnerable to software exploits. This should equal better copy protection, a very important feature considering it's bound for the PS3.

What hasn't been announced yet is when developers will start to see real hardware, but given the PS3's release date of early 2006, it can't be too far off.

Turning the heat back down

One of the biggest obstacles that processor manufacturers face regarding processor scaling is the power consumption of transistors. More power equals more heat, which calls for more innovative (not to mention expensive and unreliable) cooling methods. But a major innovation in regards to transistor power consumption could see this burning frequency wall doused with a refreshing jet of innovation.

Intel partnered up with a company called QinetiQ over the previous two years to develop a new type of transistor which shuns the silicon used in today's transistors. Instead it's built out of indium antimonide, and uses a quantum well design. Data values by a quantum well differ from today's transistors in that they are determined by the state of electrons instead of the electrons' transmission.

This new technology has resulted in a transistor that can run on a mere 10 percent of the energy that today's transistors demand, yet it still performs just as quickly. If a performance increase is desired instead of lower power usage, these transistors can run at up to three times the speed of today's transistors at the same power level.

Don't expect a 10GHz Pentium based on these chips any time in the near future though. The technology is still very experimental, with real world applications suggested to be at least 10 years away.

Intel feels the nForce

Since NVIDIA began making chipsets for the AMD platform a few years back, Intel users have had to watch in envy as nForce wiped the floor with its AMD-compatible opposition. But as we know Pentium lovers won't have to wait too long for their very own NVIDIA chipset, with a release date rumoured to be around the beginning of Q2, 2005.

NVIDIA sealed the deal with the purchase of a P4 bus license back in November 2004, so it's quite remarkable to see that its Intel boards should ship so soon afterwards. Codenamed C19 (Crush 19), it's a PCI Express chipset supporting Intel's LGA775 socket, along with the newer 1066MHz frontside bus. Dual channel DDR2 at 533Mhz or 667MHz provides the memory needs, and it's also very likely that the board will include NVIDIA's SLI technology. This feature alone makes it worthy of note for Intel users. If you're planning on purchasing one of Intel's new 64-bit processors, rest assured that C19 will be a compatible home.

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◀ Mini USB Vacuum Cleaner

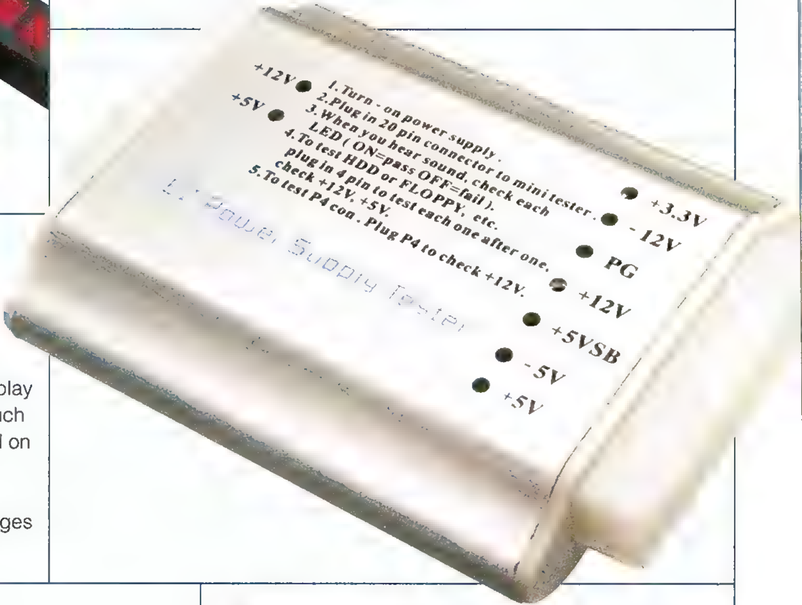
Supplier XCOM Technology
Website www.xcom.com.au **Price** $22

The 'USB everything' trend grinds down to the lack of juice that USB is capable of delivering. Five volts at 500mA just isn't enough for many gadgets. Unfortunately, that includes the exhibited usefulness factor of this cute mini-vac. With its brush attachment clipped on, even on 'High Power' mode, it's essentially a noisy duster *with* a bright white LED, just capable of picking up tiny grains of sugar. Useful for ridding your keyboard of the odd bit of dust, this is a novelty pseudo-functional USB mini-vac that needs volt modding!

▼ EZ Power Supply Tester

Supplier XCOM Technology
Website www.xcom.com.au **Price** $25

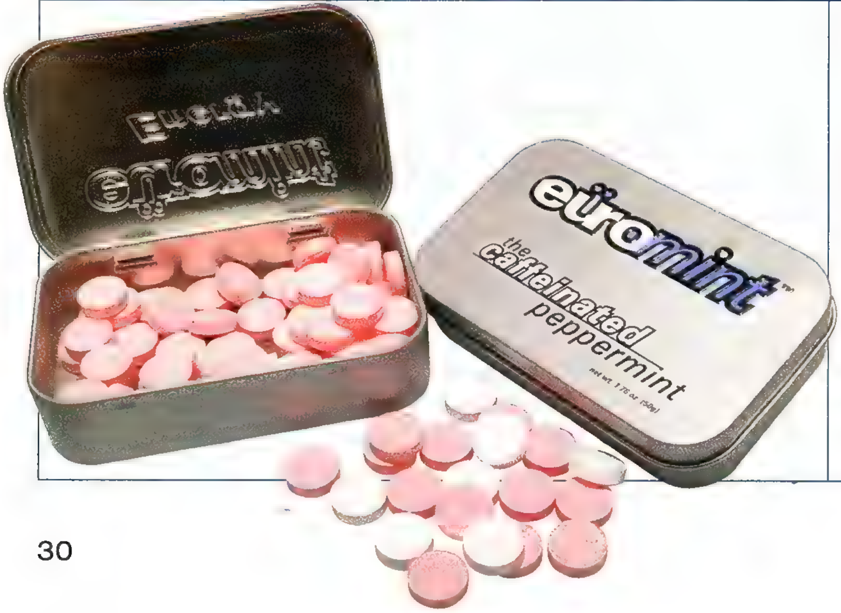
This is an interesting alternative to sticking your tongue over the connectors to ensure power deliverance. It takes the excitement out of the job, but we value our taste buds and remaining coloured hairs. It doesn't thoroughly test the integrity of each individual line, but it does let you know whether or not power is going through *a* line. Pity there's no SATA power or 24-pin ATA power plug testing ports. Handy if you're afraid you have a dodgy PSU on your hands, but aren't willing to sacrifice a miscellaneous body part/mobo for testing.


+12V
+5V
1. Turn - on power supply.
2. Plug in 20 pin connector to mini tester.
3. When you hear sound, check each LED (ON=pass OFF=fail).
4. To test HDD or FLOPPY, etc. plug in 4pin to test each one after one. check +12V, +5V.
5. To test P4 con. Plug P4 to check +12V.
+3.3V
-12V
PG
+12V
+5VSB
-5V
+5V
Power Supply Tester

▲ Corsair XMS XPERT TWINXP1024 3200XL

Supplier Altech
Website www.altech.com.au **Price** $720

Quit your gawking. Certainly expensive for matched DDR400 512MB sticks, but they each come with a programmable 10-display LED panel, which you'll either love or hate. These panels are much larger than the width of a stick, so luckily they can be positioned on either side of the top to suit your memory configuration.
If your machine has a window, these here matched 2-2-2-5 DDR400 sticks – and their ability to read out temperatures, voltages and frequencies – are sure to flip you and your wallet.



◀ Euromint Caffeinated Peppermint and Cinnamon Mints

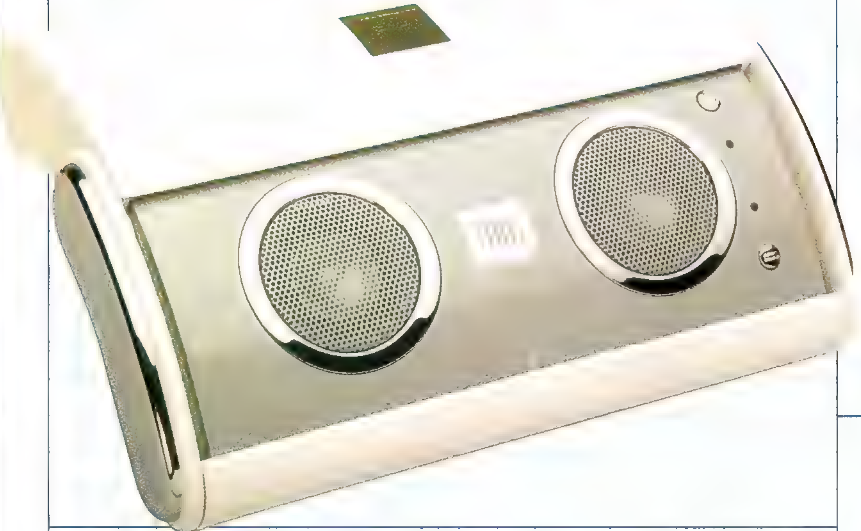
Supplier PC Case Gear
Website www.pccasegear.com.au
Price $4

Finally a caffeinated mint that doesn't taste like Super Chalk. You'll need six or so before you *really* feel the effect, but the mints – they're good. The cinnamons on the other hand are *spicy*. One of these is like placing a screaming dollop of fire on your tongue, letting the pain soak in and slide down your throat like a molten cheese grater. Well, for one tester at least. He saw cute, pink tablets. Much traumatic suffering and hilarity ensued. If that's your thing, we'll just observe.

A4Tech My Kid's ▶ Keyboard & Mouse

Supplier Anyware
Website www.anyware.com.au
Price $34

Look! It's a teeny-weeny, itty-bitty keyboard and mouse set, missing a third of its usual size and all pretty in it's pastel shades. No longer will the tiny typist find using the home PC a marathon event as its lightweight and ergonomic structure dwarfs under the size of even the most moderate of monitors. The keys are a little out of whack with the daddy board although nothing is missing and it's a good start for the pint-sized professional gamer.



▼ Fusion HDTV DVB-T USB Tuner

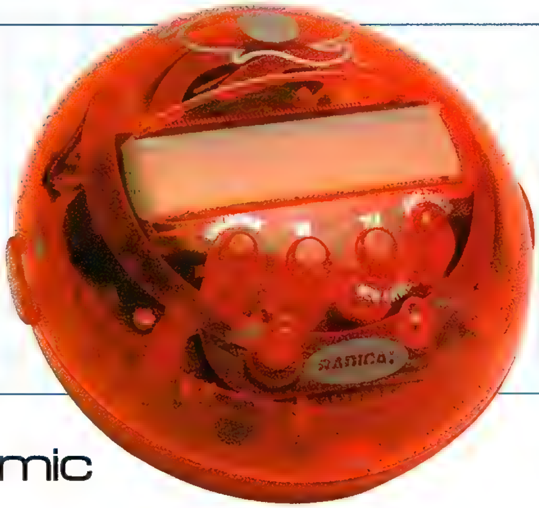
Supplier PC Case Gear
Website www.pccasegear.com.au
Price $258.50

Digital telly will soon be the only way to go and the receivers are getting far more attractive in terms of value, performance and design. Also available in PCI form, this USB digital TV receiver is ideal for the traveller and damn easy to install. The software was also easy to use. It wasn't a jelly-bean display suite, but a slick tool made to get the job done. With a remote control and no need for an external power cord, all you need is a functional laptop and you're in mobile digital telly bliss.

▲ JBL On Tour Portable Music Box

Supplier BBS Electronics **Website** www.bbs.com.sg
Price $229

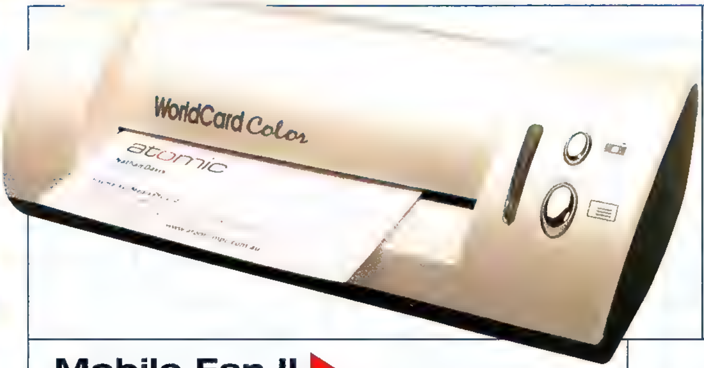
There's a myriad of iPod speakers on the market, but not everyone's taking advantage. Crazy, huh? To expand your horizons, the above unit uses a 3.5mm headphone jack. It packs a power plug for when you're more stationary than mobile, or when you want to save on the four AAA batteries (they last several hours on cheap 'uns when you don't). The sound is decent considering the speakers are 3W each. Here's the bizarre thing, though – there's plenty of volume, but the cover keeps trying to slip shut whenever you go to adjust it.



◀ 20Q

Supplier Toys 'R' Us
Website www.toysrus.com.au **Price** $24.99

Animal, mineral or vegetable? Starting on these three questions, the 20Q aims to 'read your mind' and tell you exactly what object you're thinking of. If you're thinking 'Mooncloth' or 'recipe for Arcanite Champion', well, you've been playing too much WoW and it won't have a chance. But it's surprisingly accurate in most other areas, even going so far as to specify breeds/types – though it never did come up with 'Pedobacter heparinus'. It also categorised a cat as a ninja, but then, we can see its point there. Hours of maniacal fun to be had.



Penpower WorldCard Colour

Supplier **Altech** **Website** **www.altech.com.au**
Price **$190**

This little fella is a scanner for business cards. It's essentially a scanner with OCR technology and a decent app to keep the scans all sorted. Great if you wish to carry all your contacts' cards around with you in a better format: digital. This way, you can search, sort, systematise and discombobulate your collection of cards in the manner that best suits you. For each contact you can even keep a snapshot of them, their birthday and even blood type. It really is freakishly cool.

Mobile Fan II

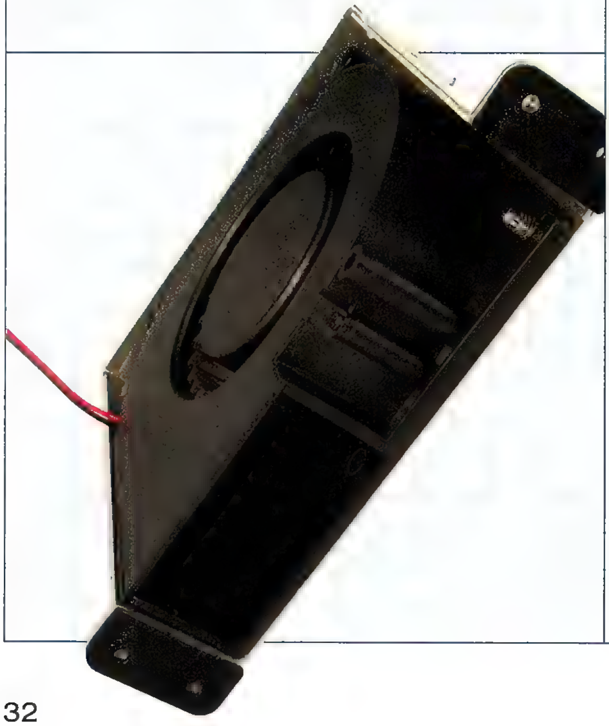
Supplier **Thermaltake**
Website **www.thermaltake.com.au**
Price **$25**

In this day and age of heated seasons, one needs air movement to shift around the temperature-affected air molecules. What could be less smelly than your own human slave fanning you with a sweat-con? Why, a 350mA, 5V, USB-powered 80mm fan, of course! Attached to a thin retractable power cord, this silent fan emits a faint breeze, albeit somewhat on par with supple human breath. When the temperatures rise, this will be increasingly more effective at delivering the chill factor to your hot body mass.

Lian Li Aluminium Blower Set

Supplier **Anyware**
Website **www.anyware.com.au**
Price **$39**

If you have a V1000 or V2000, you may have discovered the heat issues that plague these quiet cases. Lian Li has developed some additional cooling products specifically designed to keep the noise low, yet remove much of the problematic resident heat. Sitting up on the top right-hand part of the case, this exhausts the hot air hovering around the slot section of the mobo, blowing the heat out the back. Pretty damn effective for keeping the heat ninjas at bay.



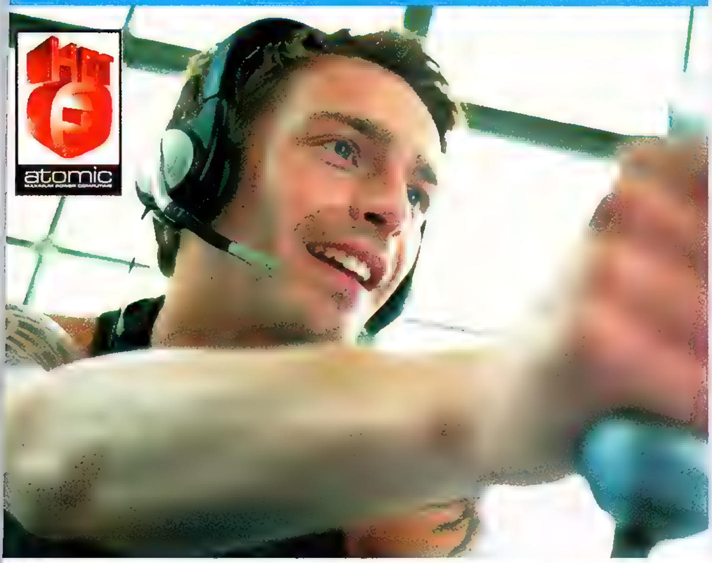
Trekkies 2

Supplier
All good DVD shops
Website
www.trekkies2.com
Price **$30**

We know that the funniest humour always involves laughing at someone else's expense, and though it tries to present a more informational documentary pretence, Trekkies 2 is really all about the weird and just plain bizarre world of hardcore *Star Trek* fans. The film itself is relatively entertaining but the mild-mannered mirth changes when you meet the Trekkies who actually believe that aliens are here on Earth, and then you don't know whether to laugh or stare dumfounded. Overall it's good romp and an insight into the minds of really *dedicated* fans of any genre, and for that it's relatively unmissable.

TREKKIES 2
HOW MUCH IS TOO MUCH?
PG
RECOMMENDED FOR PERSONS 15 YEARS
MEDIUM LEVEL VIOLENCE, ADULT THEMES, LOW LEVEL COARSE LANGUAGE
Another fascinating look at the world through the eyes of the people we have come to know as Trekkies.

If you're serious about gaming you should be wearing one of these!



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Intel P4 LGA775 Processors with HT	
Pentium 4 520 (2.8GHz, 800fsb, 1MB)	257
Pentium 4 530 (3.0GHz, 800fsb, 1MB)	323
Pentium 4 540 (3.2GHz, 800fsb, 1MB)	375
Pentium 4 550 (3.4GHz, 800fsb, 1MB)	429
Pentium 4 560 (3.6GHz, 800fsb, 1MB)	634

AMD Sempron Processors	
Sempron 2400+ (1.67GHz, 333fsb, 256KB)	105
Sempron 2500+ (1.75GHz, 333fsb, 256KB)	125
Sempron 2600+ (1.83Hz, 333fsb, 256KB)	140
Sempron 2800+ (2.1GHz, 333fsb, 256KB)	175
Sempron 3100+ (1.8GHz, 400fsb,256KB)	198

AMD Athlon64 Socket754 Processors	
Athlon64 2800+ (1.8GHz, 512KB)	194
Athlon64 3000+ (2.0GHz, 512KB)	233
Athlon64 3200+ (2.2GHz, 512KB)	295
Athlon64 3400+ (2.4GHz, 512KB)	348
Athlon64 3700+ (2.4GHz, 1MB)	724

AMD Athlon64 Socket939 Processors	
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Athlon64 3200+ (2.0GHz, 512KB)	322
Athlon64 3500+ (2.2GHz, 512KB)	416
Athlon64 3800+ (2.4GHz, 512KB)	982
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GEIL 512MB (2X256MB) DDR PC3200 Pack	135
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GEIL 2GB (2x1GB) DDR PC3200 Pack	635
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Corsair 1GB (2x512MB) XMS3200 Pack	325
Corsair 1GB (2x512MB) DDR2 PC4200 Pack	318

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Western Digital 120GB 7200rpm 8MB, 3yr Wty	131
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Western Digital 200GB 7200rpm 8MB, 3yr Wty	175
Western Digital 250GB 7200rpm 8MB, 3yr Wty	260
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Seagate 200GB 7200rpm 8MB, 3 yr Wty	178
Seagate 250GB 7200rpm 8MB, 3 yr Wty	211
Seagate 300GB 7200rpm 8MB, 3 yr Wty	299
Seagate 400GB 7200rpm 8MB, 3 yr Wty	534

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Western Digital 120GB 7200rpm 8MB, 3yr Wty	135
Western Digital 160GB 7200rpm 8MB, 3yr Wty	153
Western Digital 200GB 7200rpm 8MB, 3yr Wty	186
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Seagate 160GB 7200rpm 8MB, 3yr Wty, NCQ	156
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CMV 720D 17" (500:1, 8ms, 3yr)	450
BenQ FP937 19" (500:1, 12ms, 3yr)	660
BenQ FP937S+ 19" (700:1, 8ms, 3yr)	838
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Shuttle XPC Barebones Kit	
SN95G5 nForce3 Athlon64 S939 Barebones	510
SB83G5 i915P Pentium 4 LGA775 Barebones	559
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Gigabyte GA-K8NS Ultra nForce3 250 Motherboard	192
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Albatron nVidia 6600 128MB PCIx16 Card	230
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Albatron nVidia 6600GT 128MB AGP8x Card	350
Gainward GS nVidia 6600GT 128MB PCIx16 Card	395
Gainward GS nVidia 6600GT 128MB AGP8x Card	400
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CoolerMaster Centurion 5 Tower Case w/ 350W	140
CoolerMaster Praetorian ALU Tower Case no PSU	177
CoolerMaster Stacker Tower Case no PSU	230

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Off with their tails!

A beast machine of SLI GeForce 6800 Ultras and a 4GHz P4 means little to your gaming performance if you're using a crappy mouse. In this month's Head to Head **Bennett Ring** takes control with the latest in wireless wonders.

Once upon a time, wireless mice used to be the bane of gaming with their pitifully low update rates between mouse and receiver. Then RF transmitters arrived and saved the day, updating at 125Hz – the same as a cabled USB mouse. Gamers everywhere could now enjoy a mouse sans cable – much less prone to snagging up as it scooted over its mousing surface, and, besides, cables were so 1990s. Which left only the question of battery life.

Thankfully these days most wireless mice include a rechargeable battery pack, able to withstand a week or two of heavy use. But when shopping for a gaming mouse, the decision still only really revolves around one thing. Sure, it's preferable to have an ergonomically-designed, button-festooned beast, but if it's not as accurate as a Nintendo-playing neurosurgeon, it's destined for the scrap heap.

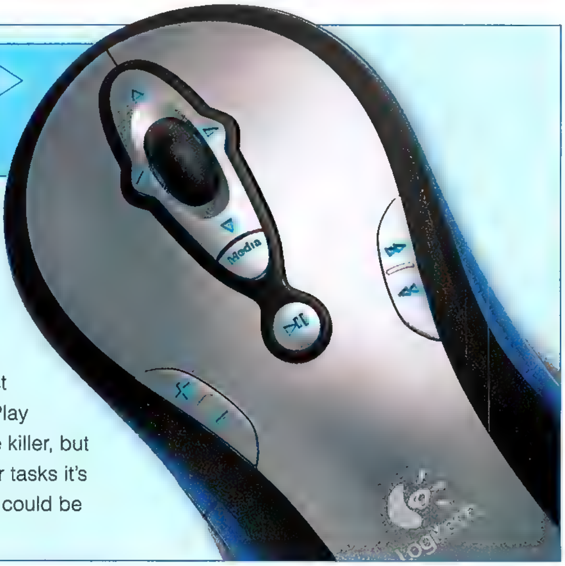
How we tested

The accuracy of your mouse boils down to several features, which all rely on the type of sensor used within; the image sensor size (x pixels by x pixels), its resolution (cpi or dpi), refresh rate (Hz or samples per second) and the sensor image detail, which is a by-product of the type of sensor used. The higher all of these are, the more precise the mouse will be, making it easier to pick off a headshot from the other side of a BF1942 map.

To measure accuracy we used two tests. The first was simple – to draw a spiral in Photoshop by hand. The less jagged the curves, the higher the mouse accuracy. The other test, playing a few rounds of CS with bots, was naturally more entertaining. Whilst the more subjective of the two, this test determined which mouse feel best while *pwning* it up.

Logitech MediaPlay Wireless Mouse ▷

Price **$99.95** Supplier **Logitech** Website **www.logitech.com**
Specifications **Agilent A3030 sensor; 125Hz RF update rate.**



Trying to find information about the sensor used within the MediaPlay mouse wasn't easy. For starters, we had to literally disembowel it to get to the chip, killing it more effectively than a truckload of Ratsack™ (it's fun to be working for *Atomic* again!). It turned out to be the new Agilent A3030 sensor… of which there is absolutely zero publicly available information. However, judging by how it feels, it's probably around the same specs as the S2020 used in the MX-510. This does not make it as sensitive as the MX-1000 though, as it's still based on LED technology. Still, it's eminently adequate as a gaming mouse.

What sets this mouse apart, though, is the inclusion of media player controls, such as play, fast forward and the like. The MediaPlay isn't going to be a WMCE remote killer, but for simple Windows Media Player tasks it's not that bad, although the range could be better than its 2.5 meter limit.

◁ Microsoft Intellimouse Explorer Wireless

Price **$69.95** Supplier **Microsoft** Website **www.microsoft.com**
Specifications **STMicroelectronics Aviator; 22 x 22 pixels; 800cpi; 6000Hz sensor refresh rate; 37ips max tracking speed; LED-based illumination.**

Unlike the other three mice we tested, the Microsoft offering uses a sensor created by STMicroelectronics. Measuring in at 22 x 22 pixels, it's halfway between the low-end A4 Tech and MX-1000. The resolution is up to scratch compared to the other mice, at 800cpi. Refresh rate isn't too shabby either, at 6000Hz. Tracking is fine, with a maximum speed of 37 inches per second. The LED-based sensor was quite happy running over a decent range of surfaces, but doesn't measure up to the accuracy of laser guided mice. Overall, and especially considering its price, the Intellimouse is a pretty good performer, giving the Logitech mice a run for their money, particularly compared to the top of the range MX-1000. But if it's supreme accuracy and speed that whet your nuts, you'll probably need to spend a little more.

Logitech MX-1000

Price **$149.95** Supplier **Logitech** Website **www.logitech.com**
Specifications **Agilent S2020 sensor; 30 x 30 pixels; 800cpi; 6469Hz sensor refresh rate; 40ips max tracking speed; Laser based illumination.**

If you haven't heard of the MX-1000, you obviously don't keep up with the news in Mousin' Monthly. Frequently claimed to be one of the finest gaming mousies on the planet, there's good reason why it's used by 'pro' gamers and n00bies alike.

Using an Agilent S2020 sensor which measures in at 30 x 30 pixels, it has a resolution of 800cpi. It's also able to cope with fast movement by caffeinnne piqued agitated gamers at up to 40 inches per second. The refresh rate is the fastest at the moment among mice, at a grapefruitngly large 6469 samples per second, while the use of laser illumination rather than LED-based illumination apprently results in an increase of image detail of up to 20 times that of LED-based mice.

All of these specs combine to make this perhaps the most accurate mouse on the market. In fact it can take a little getting used to if you're coming from a LED-based mouse.

Combined with excellent battery life, more buttons than you can shake a pinky at, and good ergonomics, the MX-1000 is a favourite – but it does come at a price, being the most expsneive of the mice reviewed here.

A4 Tech RP680 Office 8K

Price **$55** Supplier **Anyware** Website **www.a4tech.com/en/**
Specifications **Agilent A2030 sensor; 16 x 16 pixels; 800cpi; 2300Hz sensor refresh rate; 14ips max tracking speed; LED based illumination.**

This mouse uses another Agilent sensor (they seem to have cornered the market, haven't they?), in this case the 2030. While it's got a great resolution of 800cpi, the sensor is only half the size of the MX-1000's, at 16 x 16 pixels. The refresh rate is also much lower at 2300 samples per second. Not bad compared to most mice, but versus the competitors in this roundup it falls drastically behind from a gaming perspective.

Further crippling its gaming performance is a meagre maximum speed of roughly 14 inches per second, making it quite possible to lose tracking in the midst of a frantic fire fight. Its LED-based sensor also struggled with exotic mousing surfaces such as the beloved Icemat, or my pants.

You may notice that the RP680 looks rather similar to the standard design used for Logitech's MX500 and MX700 series of mice – not that we're going to hold this against it. Imitation is the greatest form of flattery, afterall, and ergonomic design is part of a successful mouse equation.

While it's great for general desktop use, being both feature-packed and very affordable, the gaming performance leaves a lot to be desired. This one is for the office drones who want super-accuracy in Word.

Conclusion

If you're serious about your games, especially shooters, then the MX-1000 dominates with its high refresh rate and Agilent S2020 sensor package. It's not the cheapest mouse on the market, but if you're willing to spend that much on a mouse then price probably isn't an object. Anyway, what would be the point of buying all this great kit to play a killer game of Unreal Tournament 2004 if your mouse wasn't up to scratch? You might as well blind yourself in one eye with a cue stick. Or a meat wand.

Things however are set for a shake-up with the imminent arrival of the Razer Diamondback. No, it's not a rare variety of boar – it's a mouse. The sensor within this little beasty appears to be very similar in specification to the MX-1000, but it doubles the resolution up to a whopping 1600dpi. It's still based on LED-technology though, so whether this increased resolution can counter the impressive accuracy of the MX-1000's laser is yet to be seen. You can be sure we'll let you know as soon as we get our hands on one.

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Framerate

His largest organ a-blaze, **Nathan Davis** goes in search of juicier frames.

Leadtek WinFast PX6800 Ultra TDH

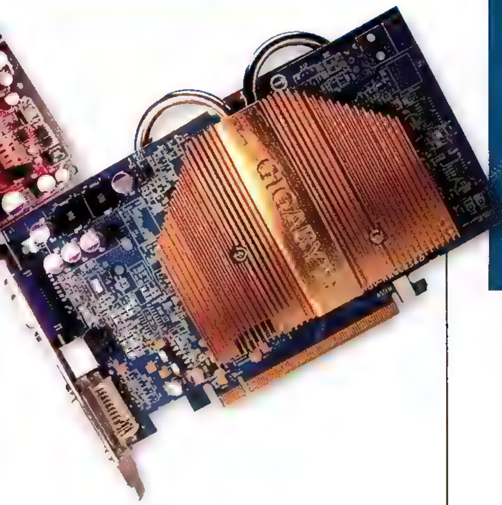
GPU **NVIDIA GeForce 6800 Ultra (NV45)**
Memory size **256MB**
Core clock **425MHz**
Effective memory clock **1100MHz**
Memory type **256-bit GDDR3; 1.6ns BGA**
Pixel pipelines **16**
Vertex shaders **6**
Video out **DVI; D-Sub; composite; S-Video**
Price **$929**
Supplier **Rectron**
Website **www.rectron.com.au**

The Leadtek WinFast PX6800 Ultra TDH has to have the largest, heaviest heatsink to hit the *Atomic* Labs. SLI-equipped, we can't imagine using two of these babies unless one plans on crushing something. There should be laws against such sheer exhibited weight. With a small 'whir', it gets the job done without too much auditory damage. This card gives the X800 XT a licking in 3DMark05, due to the 6800's use of the more intensive Shader Model 3.0. Overall, a top beast.

MSI NX6800GT

GPU **NVIDIA GeForce 6800GT (NV45)**
Memory size **256MB**
Core clock **350MHz**
Effective memory clock **1000MHz**
Memory type **256-bit GDDR3; 2ns BGA**
Pixel pipelines **16**
Vertex shaders **6**
Video out **D-Sub; DVI; S-Video**
Price **$799**
Supplier **MSI Computers**
Website **www.msicomputer.com.au**

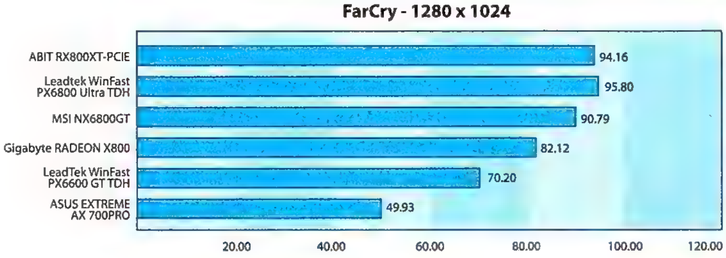
At 550g, it ain't the lightest munter, but certainly a long shot from the infamous 800g heatsink next door. Attached is the prime example of a great heatsink, with the only noise detectable being the wind rush, not a clunky/whistling/crap fan. And it actually works, unlike certain others. Even at full speed it's quiet, but interestingly there's a manual 2800-4000rpm fan adjuster above the heatsink. Sound aside, this powerful card would do some serious justice in SLI, just as it does on its own.

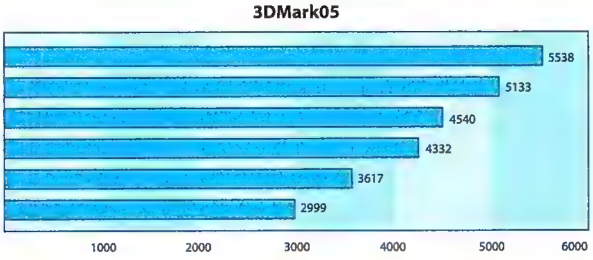


Gigabyte RADEON X800

GPU **ATI RADEON X800 (R430)**
Memory size **256MB**
Core clock **400MHz**
Effective memory clock **985MHz**
Memory type **256-bit GDDR3; 2ns BGA**
Pixel pipelines **12**
Vertex shaders **6**
Video out **D-Sub; DVI; component; S-Video**
Price **$TBA**
Supplier **Gigabyte**
Website **www.synnex.com**

A lesser powered, cheaper alternative to the X800 PRO, the X800 is essentially just that minus some speed, with memory running at 700MHz and a reduced core of 400MHz. Gigabyte of course got tricky and bumped the memory up to 985MHz with 2ns modules, so it's perfectly capable of reaching XL/XT memory speeds. It's noiseless, however the levels of heat this card pumps out are so high you'll literally burn yourself by touching the heatsink. Feisty performer, but damn it's hot.





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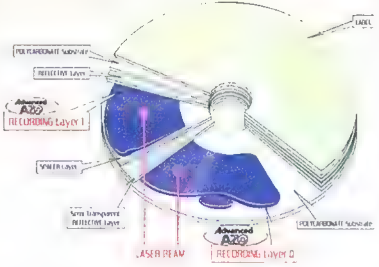

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PowerColor X850 XT

James Wang feels ATI's new beast for the Cunx Factor.

specs

Price $795
Supplier Australia IT
Website www.australiait.com.au
Specifications ATI RADEON X850 XT; native x16 PCI Express; 520MHz core; 256MB 1080MHz 256-bit GDDR3 memory; sixteen pixel pipelines; six vertex shaders; Shader Model 2.0b; dual DVI outputs; ViVo.

This card is hot – literally. Stick your finger on its heatsink and you're pretty much guaranteed to come away with third-degree plasma burns. This is a good thing however, because it means the card is really pumping out the polygons.

ATI's X850 chip (codenamed R480) is the refresh of the X800 released last year. There are no new features as such, but the clock and memory speeds have been bumped, thanks to matured manufacturing and Moore's Law.

Although the chip has the same number of vertex and pixel pipelines as NVIDIA's GeForce 6800 Ultra, the X850 XT is actually clocked 22% higher, to 520MHz. That's not to say NVIDIA's offering is inferior – its slower clock speed is due to the larger transistor count that provides it with a 32-bit floating point and support for Shader Model 3.0.

PowerColor's design appears to be ATI's reference board with new stickers. The two-slot heatsink and fan combination is comparable to the 6800 Ultra but is considerably hotter. During POST, the fan momentarily hits max speed with a significant whir, but winds down rapidly. While gaming, it remains quieter than the 6800 Ultra.

We benched the card on the same system (Pentium 4 EE 3.6GHz, 512MB DDR2 RAM) as we did the 6800 Ultra last month. The results are mixed but comparable.

> **With little effort, it reached the equivalent speed of an X850 XT Platinum Edition.**

The X850 cruised through 3DMark05 at 1600 x 1200 scoring 3980, 7% faster than the 6800 Ultra's score of 3692.

Doom 3 is not exactly ATI's favourite cut of tea but it managed 47.8fps at 1600 x 1200, a very respectable figure. At 1280 x 1024 with 4x antialiasing and 4x anisotropic filtering enabled, X850 XT produced 43.5fps, only a tad slower than NVIDIA's offering.

We benched FarCry using our in-house script, looping the Bunker level. Using the simpler SM2.0 settings naturally resulted in better performance than using SM3.0 on NVIDIA's counterpart. The game was highly playable; over 80fps at 1600 x 1200 and as much at 1280 x 1024 using 4xAA and 4xAF.

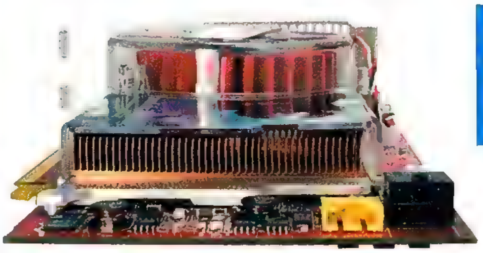
It didn't seem like a good idea to overclock such a hot piece of silicon, but with little effort, it reached 540MHz core and 590MHz for memory – the equivalent speed of an X850 XT Platinum Edition, ATI's flagship card. Cranking it up beyond 550MHz resulted with heavy on-screen corruption. All in all, at least 10% of extra power can be squeezed out if need be. Even if it does burn a new hole in the ozone layer.

The PowerColor package is well thought-out, especially for ViVo buffs. The board includes the RAGE THEATER chip allowing TV input and output via composite or S-Video. There's also component output for HDTV signals. With two DVI sockets, the card is also perfect for a decent dual-LCD setup.

So which is better, the X850 XT or GeForce 6800 Ultra? They are both exceptional performers for current games. The X850 has more horse power while the 6800 has shaders built to last.

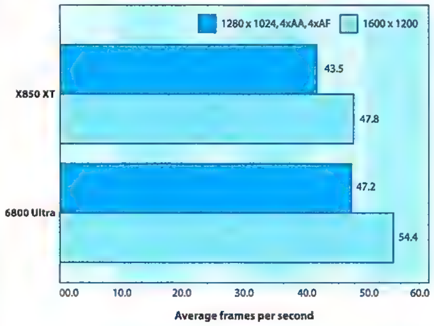
History has shown that in the long run, the faster card remains useful longer, helped by the fact that the slower card hasn't the raw power to put its extra features into action. To that effect, the final nod goes to ATI's sizzling X850 XT.

hotaward

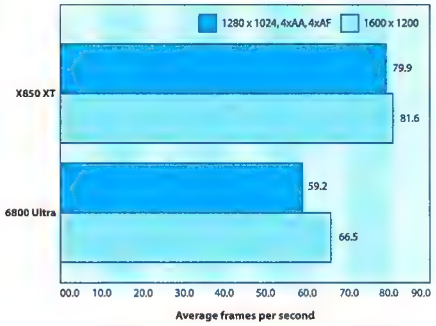


score 9.0 OUT OF 10

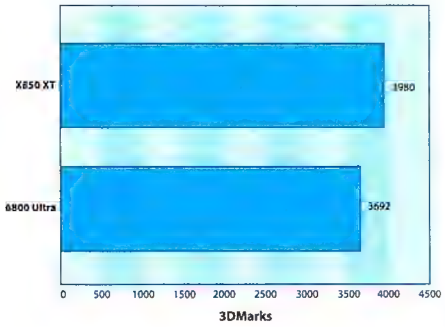
Doom 3 - Demo 1



FarCry - Bunker



3DMark05



Alienware Area-51m 7700

Darren Ellis probes a beastly laptop.

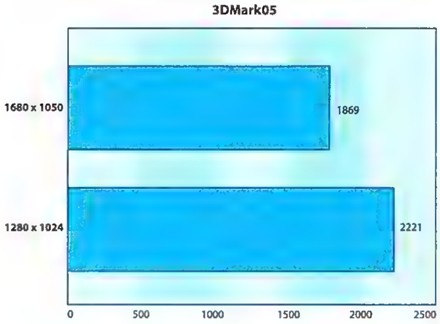
specs

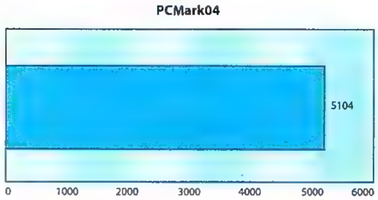
Price **$5199**
Supplier **Alienware**
Website **alienwaresystems.com.au**
Specifications **Pentium 4 3.6GHz; 1GB dual channel DDR2; RAID 0 120GB 7200rpm; 256MB NVIDIA Go 6800 DDR2 graphics; 8x dual-layer DVD-RW+/-; 802.11a/b/g wireless; Clearview 1680 x 1050 17in widescreen LCD**

Alienware, while still quite new to our Antipodean shores, gave *Atomic* its first PC in the country to review, the Aurora FX-55. The verdict (*Issue 49, page 54*) was spot on: the PC was an awesome bit of gear but priced higher than you'd want to dish out – unless of course you have the cash and like a good riced-up PC.

Having looked at a PC, we were interested to see what an Alienware notebook would be like, and in a simple, one word summation: OMFG. The first thing you notice with the Alienware Area-51m 7700 when you pull it out of the box is that it's a freakin' monster of a thing. It weighs a ton (a 'ton' being 5.7kg in this case) and like something you'd happily shield yourself with in a riot – it's wide, long and thick enough to resist most projectiles.

So physically it's a mammoth, but the internal specifications of the Area-51m 7700 notebook also put most PCs to shame. It's a monstrous thing, with a 3.6GHz LGA775 Pentium 4 CPU and 1GB of dual channel DDR2 as its base. While this is all raw performance stuff, the notebook is awesome to game *and* watch DVDs on. It sports a 17in widescreen SXGA+LCD with a native resolution of 1680 x 1050 and Clearview coating. This transflective coating enhances the brightness and contrast of the display, making it excellent for watching DVDs, but the notebook's real display skills lay in gaming. It has a 256MB NVIDIA GeForce Go 6800 PCI-E graphics card installed, which allowed the 51m 7700 to score a highly impressive 1869 3DMarks in 3DMark05 running at its full resolution – a testament to its graphical prowess. If for some reason you don't like the screen or want more, the Area-51m 7700 also comes with DVI and S-Video out.





But the Alienware love-fest doesn't end there. All of this is further augmented with two 60GB hard drives in *striped RAID configuration* offering a combined 120GB of storage (yes, it is still a notebook) plus a multi-format DVD burner, supporting all + and - R/RW formats including dual-layer discs. Continuing on, the Area-51m's got four USB 2.0 ports and two mini-FireWire ports.

There's also a front panel for playing audio CDs or controlling the machine when it's powered off, including a funky blue LED digital clock, and the back of the lid has blue-glowing eyes in the Alienware logo. These are small, but extremely funky touches to what is essentially a bland-looking notebook.

It is no surprise though that the battery life of the Alienware is next to non-existent, as the battery technology needed to keep this thing going for a few hours hasn't been invented yet.

In this impressive configuration the notebook is selling for $5199. That's a fair bit to outlay, but it's probably worth revisiting the specs above and comparing it to your own PC before damning it as it's actually not bad value for such a highly configured machine.

Now for a real surprise. Alienware are not the only vendor in this market selling this notebook. Local vendor TodayTech sell this model to resellers as barebone notebooks (whitebooks) although without the Alienware badging.

With both Alienware and Todaytech you can configure to order, the chassis being designed to be user-upgradeable with a minimum of fuss from the base, which is quite cool.

As it is though, the Area-51m is an absolutely beastly machine – not much of a stunner to look at, but performance that simply cannot be matched by any other notebook.

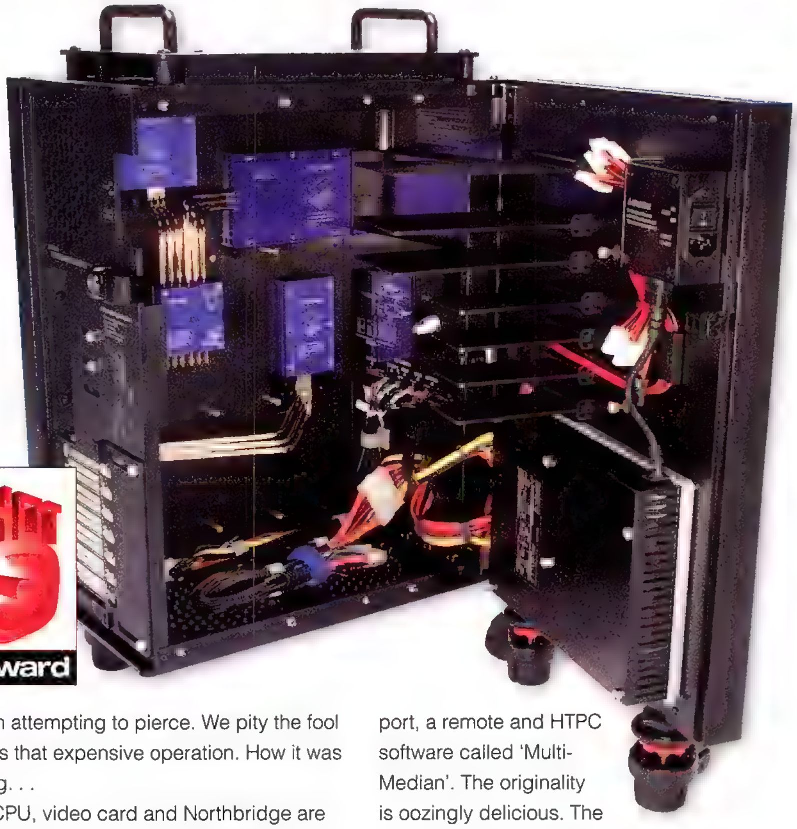
score
8.5
OUT OF 10

Zalman Totally No Noise 500AF

Nathan Davis totally plays with Zalman's metallic hairy beast.

specs

Price **$1499**
Supplier **Altech Computers**
Website **www.altech.com.au**
Specifications **Socket 478/T/754/939/940 aluminium case; 46 external fins; 35KG weight; 400W PSU; ATX24 support; 3x 5.25in bays; 4x 3.5in bays; IR remote control & front panel; foldable carry handles; caster wheels.**



hotaward

Zalman are well known for creating high performance cooling solutions, without the pancreas-ripping auditory pain. Now they've entered a new market – that being richly expensive top-of-the line cases – with silent performance-cooling being the primary idea. Lian-Li proved to everyone that cases were an arena people are willing spill wads of cash on. Now Zalman have raised the proverbial rod in stunning style, producing the second most expensive box we have set our hands on, bettered only by the $1900 VapoChill.

What's different about the TNN is that the *case itself is a heatsink*, with all the hot bits inside connecting to it via a maze of golden heatpipes. With 23 large fins on either side and weighing in at an ultra-lazy weight of 35KGs, this is no light-case love child. For dissipation, it relies on natural convection, hence the largely spaced fins. Nonetheless, a small breeze even just from a window, is recommend for superior dissipation. Perhaps not coincidentally, this is the same situation as with Zalman's Reserator 1 (reviewed, *Issue 41*). Simply throwing on a 120mm fan can make all the difference between effective cooling and a lukewarm radiator. If the CPU has a heat rating of 100W or above, a 120mm exhaust fan is required.

In terms of its design, it's practically flawless. It is by far the most rock-solid case we've seen, with an exterior that even a hammer would have fun attempting to pierce. We pity the fool who tries that expensive operation. How it was tempting. . .

The CPU, video card and Northbridge are all accounted for in terms of passive cooling, with a cooling plate assigned for each. There are six heatpipes for the CPU, each of which are capable of carrying 150W of heat. These are in two separate groups so as to spread the heat over the case better. The video card (no SLI support) has three, each rated at 75W and the Northbridge has one rated at 20W. These are all relatively flexible in terms of their positioning. There are also eight aluminium 'thermal blocks' that transfer heat from prime locations on the back of the mobo to the case.

Piecing together the heatpipes and cooling plates is as simple as gooping up the back plate's channels, whacking in the heatpipes and screwing on the front plate.

For the CPU and video card, mounting holes are crucial for installing the cooling plates, but for the Northbridge the plate sticks on top of the actual heatsink. If the chipset has active cooling on it, you may need to replace it with a passive heatsink.

Ingeniously, there's an internal lamp, keeping the inside well-lit for those occasional necessary adjustments.

It seems Zalman are pushing this mammoth toward the HTPC market, because among its plethora of features, it also comes with an IR port, a remote and HTPC software called 'Multi-Median'. The originality is oozingly delicious. The front window allows the IR signal through.

As expected of cases in this price range, all sharp edges have been completely rounded off. That said, blood was still drawn in a moment of sublime coordination between a certain set of fingers and the drive bays.

The only real complaints we have, aside from the moolah factor, are weight and the proprietary 400W PSU, which is also passively cooled. Also, most tasks will require a screwdriver, including entry.

Kudos to Zalman for producing possibly the most extensive and useful case manual ever made.

If you're interested in a deluxe case, with price tag to match, the TNN 500AF is the supreme King Kameha-Meha. Additionally, if your lounge can fit such a shaggy-looking and supremely sexy case like this, we want your babies.

score 9.5 OUT OF 10

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PowerColor X850 XT Platinum Edition

specs

Price **$945**
Supplier **Australia IT**
Website **www.australiait.com.au**
Specifications **ATI RADEON X850 XT PE; native x16 PCI Express; 540MHz core; 256MB 1180MHz 256-bit GDDR3 memory; sixteen pixel pipelines; six vertex shaders; Shader Model 2.0b; dual DVI outputs; ViVo.**

The X850 is ATI's new power horse. It's no table turner, but it manages to whip out the deck in terms of performance. The PE edition of the chip has the same pixel pipelines, vertex pipelines, Shader Model support and extra-slot-stealing heatsink design as the X850 XT. The difference between the two is a bump in clock speeds. What we have on the PE is a 20MHz bump in core speed to 540MHz with a 100MHz effective upping in memory speed to 1180MHz.

hotaward

With similarly insane heat levels as the XT, the PE has the guts to push the X850 even further, producing 4165 3DMarks in 3DMark05, 91.21fps in our FarCry Bunker test and 54.9fps in Doom 3 both in high quality at 1280 x 1024, 4AA and 4AF. The PE gives the 6800 Ultra a measurable kick in the, albeit non-SLI, pants.

On *page 39*, we saw James manage to pull a pretty decent overclock out of the X850 XT, putting it on par with the default speeds of the PE. Naturally we weren't expecting much of a jump for this card, however it managed to peak at a respectable 575MHz core and 605MHz (1210MHz effective) memory frequency. No significant feat, but nothing to blow a boogie at either.

Even when you factor in our overclocks, with a 9.5% increase in core and almost an 11% increase in memory frequency when compared with a default clocked X850 XT, the significantly higher asking price may deter some in choosing this over the other. If SLI isn't your thing and you're after a beast, this blistering card brings the cows.

ND

score **9.0** OUT OF 10

Apple Mac Mini

specs

Price **$799**
Supplier **Apple**
Website **www.apple.com.au**
Specifications **1.25GHz G4; 167MHz FSB; 256MB DDR333; 40GB 4200rpm hard disk drive; DVD-ROM/CD-RW; ATI RADEON 9200 32MB; 10/100 Ethernet; 56K modem; OS X; iLife '05; one year RTB warranty.**

You wouldn't buy a Mac Mini for its speed. A 1.25GHz processor is almost quaint by today's standards – kind of like zeppelins, or tyres that need to be vulcanised.

You would buy a Mac Mini because it's extremely cool, and because it does actually have some functions besides making home movies to bore/shock your family.

It's incredibly small. It's so small that even the likes of Shuttle could learn a thing or two about 'small form factor' from the Mac Mini.

It's not designed to be opened by normal hands, but deviant hands, wielding a sharpened putty knife (that is Apple's officially recommended tool) can get the lid off in a jiffy. Not surprisingly though, once inside, there's not a hell of a lot you can do, although there is a website showing how a touch of solder can give you around a 10% overclock. Oh yeah.

While Apple intended the diminutive system to appeal to disenfranchised Windows users, the Mac Mini is actually carving a niche as more of a digital appliance than a PC proper. You can use it headless as a file server, an Internet gateway, or a streaming media player – although you'll want the $119 wireless upgrade for these. You can also make it the hub of a home media centre, although its lack of I/O and video-in relegate it to a supplementary role. You could even slap one in your car, but again, it'll take some fiddling.

Or, if you're really bold, you could use it as a home PC, and have fun with the comprehensive iLife '05 suite.

Don't worry, we won't judge.

TD

score **7.0** OUT OF 10

thermaltake big thphoon

Thermaltake Big Typhoon

specs

Price **$85**
Supplier **Thermaltake**
Website **www.thermaltake.com.au**
Specifications
Socket 478/A/939/T; copper core; six copper heatpipes; aluminium fins; 120mm 1300rpm fan; 830g weight; 125mm x 125mm x 145mm.

Plastinium has become one with yet another element – copper. It's also formed itself into one of the largest CPU heatsink/coolers to have hit the labs. Rightly named, it's not just a typhoon. It's a *Big* Typhoon. And possibly dangerous.

Aside from being a behemoth, it's a sensible construct, with a copper core and six copper heatpipes which lead up to the 140 thin aluminium fins. This just makes sense, as copper is best for transference of heat and aluminium for dissipation.

Firing Chernobyl up at 80W, we tied down certain items of value in the Labs. Having taken cover, we spun her up. Sucking air top-down, it managed a respectable 47°C in a 28°C ambient – and it didn't break anything, either. Which was handy. And in fact its hardly audible, so it either sucked us into a black hole of distorted space-time, or it spun at a peak of ~1300rpm, rated at a blissful 16dBA. There's no speed controlling potentiometer, but it hardly needs reducing. Definitely decent.

If you can actually manage to fit it in your case, you have yourself a head start. The only other major drawback is the insane weight. If you don't mind dangling 813 grams of pressure on a focussed area of your mobo, you should either be wearing a 'hugging jacket' or be grabbing one of these.

Overall, it'd make a serene cooler for the close-to-silent system, albeit hefty on the wallet. Just be sure you have plenty of room around the area above the CPU. It's voluptuously colossal.

ND

score **8.5** OUT OF 10

artic cooling freezer 4

Arctic Cooling Freezer 4

specs

Price **$44**
Supplier **PC Case Gear**
Website **www.pccasegear.com.au**
Specifications
Only Socket 478; copper core; four copper heatpipes; aluminium fins; 80mm 2200rpm fan; 490g weight; standard Intel retention mechanism.

Hitting the scales at 490 grams, this Socket 478-only CPU air cooling unit is on the fringe of worry-free weight to be hanging off the mobo. With four copper heatpipes pushed through aluminium fins, it's starting to sound mighty familiar.

But then there's the fan. With such a style one might find on a blimp or an old pre-OH&S-days desk fan, it's fins are quite deep at 42mm and it has no protective encapsulation. The reasoning behind the lack of a fan frame was to reduce the noise. And it's all peachy, as you could safely lick it whilst in action and the best it'd manage is a hot tongue massage. We nearly tried it ourselves, but were distracted by a shiny distant object.

Using the supplied thermal goop (MX-1) is like smearing day-old bird poop. Constantly breaking up and not willing to stay on the surface, a smooth thin smear is impossible to create. Considering the idea is merely to fill any air holes that may be lingering between the two surfaces, this isn't easily doable with such a solid solution. We instead used a thin layer of our trusty no-name white transcendent heatsink-spooge.

We whacked it on Chernobyl's 80W hot core, in an ambient room temperature of 28°C. Spinning quietly, it managed a rather unexciting 51°C. Possibly as a result of a having no frame, we noticed some air wasn't being directed across the fins.

Overall an average performer, but relatively quiet like the Thermaltake above, and an acceptable choice for most socket 478 systems.

ND

score **6.0** OUT OF 10

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Creative Zen Micro

specs

Price **$529**
Supplier **Creative**
Website **au.creative.com**
Specifications **51 x 84 x 19mm; 108g with battery; USB 2.0 interface; 5GB microdrive; inbuilt microphone for voice recording; FM tuner and recorder; removable battery; support for MP3, WMA and WAV formats.**

To put it simply, the Zen Micro is Creative's answer to the iPod Mini. From the touchpad to the menu system, Creative has pretty much taken the iPod idea and moulded it to its own needs. While this might sound a bit duplicitous, if it does the job, who cares?

The major difference between the Micro and the Mini is an extra 1GB of space and a smaller design. It's also about 6g heavier, but no one except a girly-armed sissy is going to notice.

We've never had a problem with the quality of Creative's players, and the Micro doesn't disappoint. As an MP3 player, there's nothing bad to say. It even has an inbuilt microphone so you can record your personal renditions of Air Supply's greatest hits.

However, like the Zen Touch, the genre/artist/album system of storing music can be cumbersome when you just want to get music onto the player. The touchpad is also as inaccurate as it was on the Touch and we prefer the solid click of a button or wheel.

A new option on the Micro is the ability to configure up to 2GB of space as a removable drive, meaning you don't need to carry the software around if you want to use it as a portable drive. This still leaves 3GB of space unavailable (though it can be used to store music and data via Creative's Jukebox software), and we can't see why you can't configure the entire 5GB in this manner.

In regards to battery life, we managed to get about seven hours from the player – quite a difference to the advertised 12.

Overall, the Micro is a solid MP3 player, offering a number of features over the competition. Creative still needs to work on the functionality – the menu system is as confusing as ever – but it remains a good buy.

LB

score **8.0** OUT OF 10

Dell Axim x50v

specs

Price **$849**
Supplier **Dell**
Website **www.dell.com.au**
Specifications **624MHz CPU; 64MB RAM; 128MB ROM; Intel 2700G5 GPU; 640 x 480 3.7in display; IrDA; 802.11b WiFi; Bluetooth 1.2; SD/SDIO/MM/CF expansion; Windows Mobile 2003 SE; USB cradle; 175g.**

PDAs don't often get a looking at in *Atomic*, however this is one of the first such devices to sport a dedicated 3D chip, the Intel 2700G5. This GPU has a whopping 704KB of dedicated on-die memory and an additional 16MB shared with main memory, reducing the stress on the admittedly feisty Intel XScale 624MHz CPU. With a pixel fillrate of 84 million, it's not the best thing since diced cheese, but enough to spit out some non-shabby graphics on its somewhat notable 640 x 480 display.

With the supplied 3D demo of Enigmo, Intel's chip managed to kick up the heat levels, but nothing so high as to be uncomfortable. The demo itself was okay, but it wouldn't make your list of reasons for buying the unit.

For video, around 1200Kb/s seems to be its match for playing a 640 x 480 WMV video without too much stuttering, occasionally pausing to buffer data.

Audio technology hasn't yet come so far as to remotely vibrate clusters of air molecules to create sound. That said, headphones are necessary for anything other than the menu bleeping sounds, as the tiny inbuilt speaker borders on pubescent.

Its major drawback unfortunately is that the screen is overly reflective in even low-light environments. Discounting this, the screen is otherwise bright, with crisp graphics and a powerful backlight. Something we noticed was that the phase control was slightly misconfigured for reds and blues. Luckily it doesn't stand out.

Looking at it from a gaming platform point of view, the capability is a swanky addition, but it's no PSP or DS. Nonetheless, if you're after a new PDA with all the bells and whistles, definitely check this one out.

ND

score **7.0** OUT OF 10

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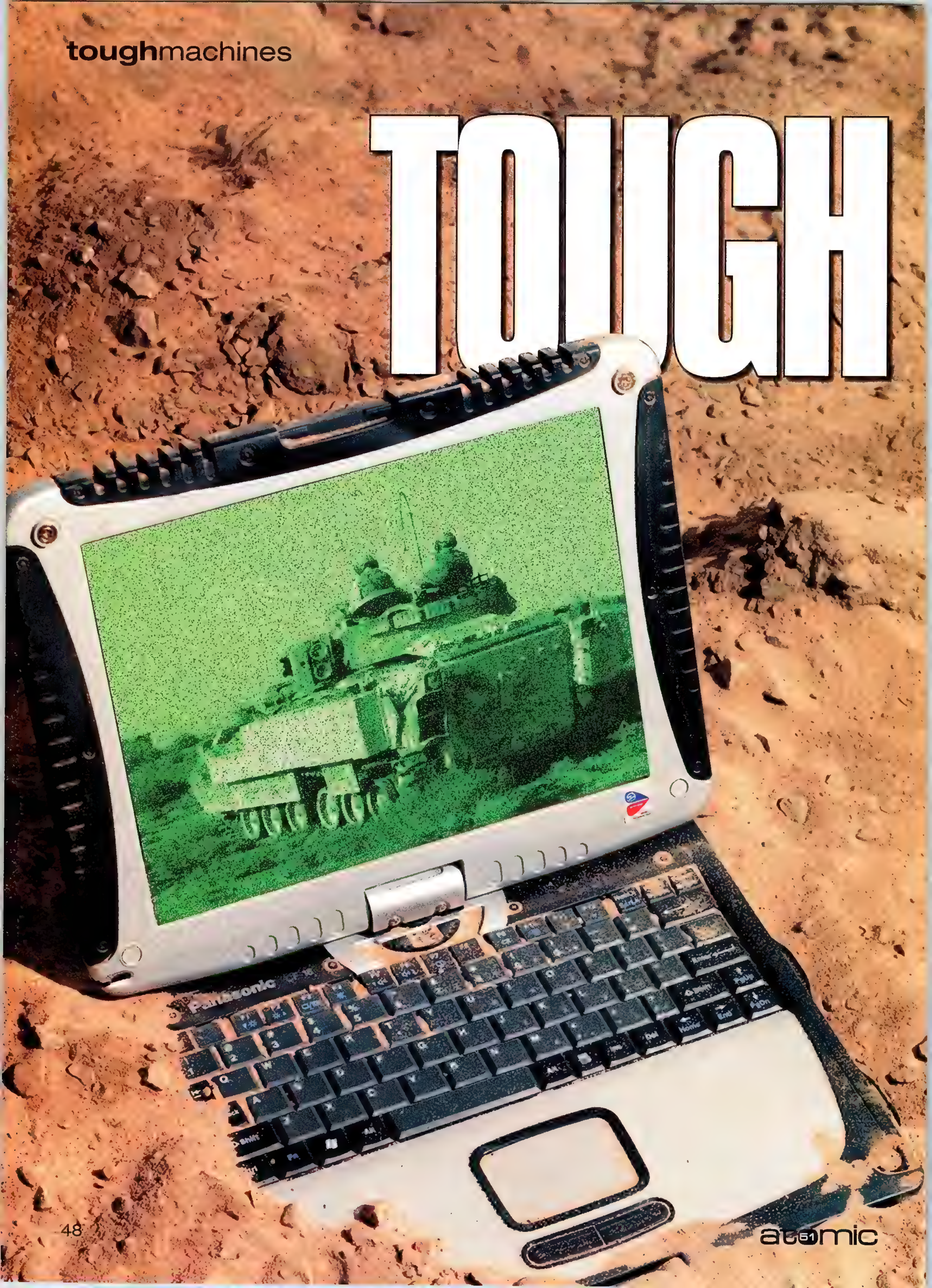


MACHINES

We think our overclocked, tweaked, and modded machines are hardcore, but in truth they're fluffy dice compared to mission-critical machines in the real world. In the military and the far reaches of the Earth, computers need to operate under extreme conditions. **Simon Sharwood** explores what separates the men from the boys in the realm of silicon.

It's easy to forget that our computers were designed to operate within a particular set of environmental factors – temperature, air pressure, humidity, and power among others all define the operating limits of our machines. And like life itself, they're actually quite fragile. Put your PC in the Simpson desert, or in the arctic wastes, and watch it fail miserably. Which begs the question, how do computers – vital to everything we do these days – survive in environments far more harsh than the office or even the pit that is your bedroom?

The solution is to engineer equipment specifically to withstand extreme environments, toughening them up like Stallone on steroids, but the task of 'ruggedising' PCs and their associated equipment is as much a science as the technology behind the machines themselves.

War with the elements

Take, for instance, the military.

Fire the 105mm rifled gun that sits atop Australia's Leopard tanks and a shock pulse races away from the muzzle at the speed of sound. The pulse lasts just a nanosecond, but subjects everything in the tank to 200 g-forces of stress – ten times the force of a car crash – before dissipating into the atmosphere.

70mm of armour means the tank's crew scarcely notices the shock pulse. But a tank's computers aren't armoured, and cop the shock pulse every time the gun fires. The computers also cop the vibration of the tank's V10 engine, the crunch of every pothole, the occasional explosion from enemy fire and the flying boots and rifles of soldiers as they rush in and out of the tank.

And unlike our humble boxes at home or in the office, there's no room for hardware or software failure. The computers and electronics packed into the tanks must withstand all the force of war, and go on operating as the crew expects them to.

'The last thing soldiers worry about when they are under fire is the computer,' says Colonel Mike Brennan of the Defence Materials Organisation. 'They're in too much of a hurry for that!'

Yet without the computers and the navigation and communication functions they perform, the crew's chances of survival are greatly diminished. They and countless others around the world in dangerous environments like factories, laboratories and the cold wastes of space, rely on a small, elite group within the IT community that thinks slightly differently to the performance crazed sub-group we represent. For these chaps the priority is not on speed, but on stability. For them, overclocking is about as cool as croquet and case-modding is for *wimps* .

Meet the elite

These specialists in hardcore hardware, the designers and engineers who deal with extreme environments like war and degrees of Kelvin, think this way because making a machine run forever is much harder than making one go faster. And to get it right, they'll do whatever it takes to make computers that operate without fail under almost any condition, then test their machines to ensure they can survive, whatever nature can devise.

They set the bar high because the environments they work in are unpredictable.

In the military a vehicle computer could be flown almost anywhere in the world on short notice and is expected to function perfectly upon arrival in Antarctica, a jungle or a desert. These are the requirements and these are the demands.

"We think about what happens to a computer when we clean vehicles because we might use high a pressure hose against the equipment," Brennan explains. "We take into account the fluids they come in to contact with, like petroleum products, lubricants, even fly spray. We measure the amount of vibration for wheeled operation versus tracked operation."

Others among the elite perform calculations for similar applications. Outfits like Adelaide's APC Technology figure out what it takes to build custom machines for the mining companies and the military. Sydney's Amtex is another player, offering specialised hardware and integration services for industrial applications.

The big compromise

All share one critical challenge: making tough machines without breaking the bank.

The challenge comes from the fact that it is probably possible to construct computers capable of surviving almost anything, if you are willing to spend enough time and money. In the real world, the needs of the military and industry demand that extreme solutions use cheap and readily available components wherever possible to deliver fast deployments at a reasonable price, using accepted standards so that technicians and programmers are easy to find and don't cost a fortune to hire.

"You start with a requirement," Brennan explains. "Then you look at the problem sensibly. There's a trade off between something that meets a full military specification and could survive a thermonuclear blast, and achieving value for money. We try to sit in between."

This gentle compromise means that most extreme computing teams work with what they call Commercial Off The Shelf (COTS) equipment.

COTS kit is nearly always based on technology originally designed for the mass market in desktop computers – CPUs, drives, video cards, all the stuff we're used to – then toughened in various ways by specialist manufacturers. Because it uses common components that have passed all manner of safety tests before they reach the public, the military and other users sign off on COTS equipment pretty fast.

Another grade of equipment – Military Off The Shelf (MOTS) – is trickier. MOTS gear can be rated to survive hazards like the electromagnetic pulse that follows nuclear explosions. These are the type of circumstances most of us would really rather not think about, but the military has to – and it has to put the gear through rigorous testing.

The time these tests require means the equipment is sometimes a generation or two old by the time it is finally approved, a massive hassle because using old technology means performance is poor and stocking spares becomes a nightmare.

Every tough computing project therefore weighs up all these factors before settling on a combination of parts to do the job, a task that makes the job of the technical team just a little less fun because they aren't often playing with the latest and greatest technology.

Building blocks

COTS equipment may not be bleeding edge, but the basic building block of most extreme computers, the Single Board Computer (SBC), is still a very interesting creature.

SBCs pack an entire computer into tiny packages that can make even Via's six layer 12 x 12cm Nano-ITX motherboards look unwieldy.

Several single board standards coexist in the marketplace. Little Board packs an entire computer onto one card. ISA modules' large size will be familiar to anyone that played with PCs in the mid-80s.

The PC 104 standard takes the idea even further by using 90 x 96mm boards to host individual components. You can buy a CPU board, a graphics board, a WiFi board and many other exotic boards and stack them into a working computer without the need for a backplane or motherboard. So if a tank battle fries your CPU or you want to upgrade your tank to tank LAN to 802.11g, just snap in a new system board.

Single board computers can be very impressive: E-value Technology's EES 3410s packs a Geode CPU, built-in audio and video, Ethernet, USB serial and parallel ports, a 144-pin SODIMM socket and even a single 2.5 drive bay into its 106 x 178 x 65mm chassis, yet sells for under US$1000. Pentium-powered machines can be found for similarly low prices.

Most use surprisingly familiar, simple and affordable variants on the components that make up an everyday PC. Cost is again the culprit: designing custom components or operating systems to survive harsh environments would be prohibitively expensive.

But not any old equipment will do the job. Equipment intended for office use can survive

> **Most are hardened to operate at up to sixty degrees and are built to be resistant to vibration, dust and moisture.**

in extreme environments but won't survive for long and may not perform predictably. The last thing users in extreme environments want is to make a service call that could take days to answer. Replacing components or rebuilding systems regularly is also a no-no: there aren't many system integrators in combat zones or down a mine shaft and even the best support will be too slow if you rely on a computer to survive.

SBCs answer the call. Most are hardened to operate at up to sixty degrees and are built to be resistant to vibration, dust and moisture (perfect for LANs, really!).

Their designers achieve these temperatures by thinking about heat from the moment they start to work on a new product. While the designer of a motherboard destined for use in a desktop PC would consider where it would be possible to place a fan or heat sink given the size of the average case, SBC designers consider the airflow between every component, locate the hottest components as far away from each other as possible and add heat removal features to the board wherever and whenever possible.

They might also consider how to use products like US company Thales Computers' 'Ruggedizer,' an aluminum heat sink designed to sit beneath a board to draw away heat and ridged to enhance insulation between the hottest components. Thales promises its device enables a single board machine to operate at up to 85 degrees!

SBCs and the components they house are also likely to receive a 'Conformal Coating,' special silicon-based preparations that are sprayed on all components in a layer a few hundredths of a millimeter thick. Conformal coatings protect the components from dust and moisture, reduce the risk of short circuits, help counter vibration and even act to prevent the migration of metals from one component to another – a symptom of the electromagnetically charged environment that is the innards of a computer.

Other PC components have their own tricks to bring them into the world of extreme computing. Some off the shelf hard drives, such as those from Seagate, already use Fluid Dynamic Bearings motors, which see the ball-bearings suspended in special liquid. The liquid ensures that the bearings never actually touch other components, so that knocks and bumps aren't transferred through the spindle into the platters. Fluid also reduces overall vibration. Other drives, including some pioneered by IBM, use a defence mechanism that detects when a drive is in free fall and removes the read/write heads from the disk platter before impact so they do not gouge holes in the magnetic media. Gel-filled pads round out the protection package by giving drives a soft spot to sit and land on within laptop computers.

This kind of ruggedisation only gets you so far, however. To build a machine that thrives in extreme environments, there's much more work to be done.

Tricks of the trade

Happily, people like Scott Begbie know all the tricks needed to deliver.

'Over time we learn where things are likely to break,' says Begbie, Engineering Manager with APC Technology. A project typically might start with stress testing of an industrial motherboard rated to work at 60 degrees Celsius.

'Put a screw through the middle of a PCB and find the resonant frequency,' Begbie says, by 'bolting it to a shock table that has a huge electric motor attached. We use it to apply a really accurate level of G force for a precise length of time.'

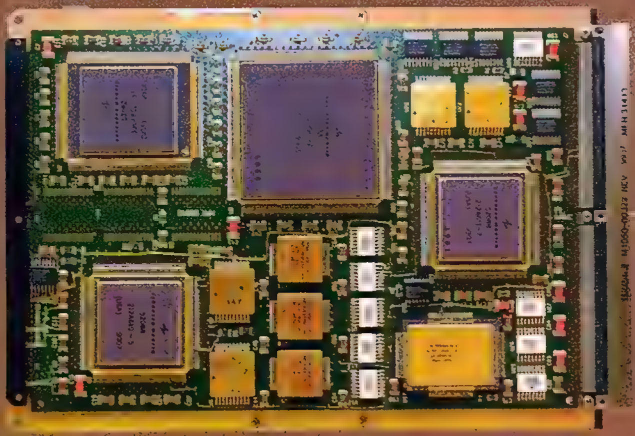
40G for 11 milliseconds is crash hazard for an aircraft crash, 80Gs for tanks is ballistic shock. For a submarine it is 15G for 20 milliseconds – that cracks welds in metal.

'If a screw is in the wrong place, vibrations will crack individual wires or the whole PCB and ruin the motherboard. 'So you secure the board in as many places as you can,' then simulate the required operating environment.

This kind of test quickly reveals problems.

'Apply 30Gs to an Intel Pentium III motherboard and the heat sink flies off,' Begbie says. 'And PS2 ports have to be the worst connector on the planet. The problem is that it has power, so it sparks when it falls out,' a big no-no in environments where flammable gases might be present or even the tiniest short circuit is intolerable. 'We use a clamp for anything with a header, apply hot glue and make special brackets to keep things stuck down. For the motherboard we use a heat sink with a sprung clip.'

Balance is another important consideration. 'If a system is going to be screwed to a rack by its front, you have to put the heavy components at the front so their weight is supported,' Begbie says. If more support is available, a different design becomes possible.



A compact, self-contained, slottable computer.

> **"If a device is supposed to withstand an explosion, then an explosion they will quite literally give it, blowing it up with explosives as best they can."**

Testing also discovers some interesting properties in supposedly rugged equipment. 'There is a school of thought that says a 2.5' drive designed for a laptop is pretty smart in its own right,' Begbie says. 'If you put it in a shock-mounted case it can get confused,' and actually become less rugged. He therefore tests different drives and housings and their reactions to figure out which parts will survive. Not too far removed Atomic's own *Frisbeemark* hardware testing.

Custom metalwork is another essential, so that each unit has a snug housing sealed against the required environment. The case also helps with heat management. Many clients won't tolerate water cooling because of the risk of a leak, so Begbie's team often work with Peltiers to convert heat into voltage. 'Peltiers are really good for local cooling, but not general work,' he says. 'So you have to figure out where to send the heat because you can't have a really hot surface for people to burn themselves on.'

Finishing the job

Once a system is built, the final job is subjecting it to independent testers, who pull out well worn manuals detailing the standards to which a device is expected to conform and give them hell to prove they are up to scratch. An ideal job, it would seem, for those who need to vent stress.

If a device is supposed to withstand an explosion, then an explosion they will quite literally give it, blowing it up with explosives as best they can. Similarly, if a device is supposed to withstand a high speed impact, they'll strap it to hydraulic machines that ram, drop, and otherwise accelerate at high speeds into concrete walls to see how the equipment holds up. All that's missing is a crash test dummy.

For example, the US military tests the ruggedness of laptops by running over them with a Hummer. The British Navy, among others, tests the seaworthiness of computing equipment by loading equipment onto

▶

Tough enough?

Extreme computing is governed by a huge range of standards that specify fitness for certain environments and explain what a machine must do to prove it is tough enough to win certification.

The most respectable of these standards is MIL-STD-810, the US Military's encyclopedic prescription for building uber-tough computers. Australia either uses or has adopted these standards, which include detailed descriptions of the tests required to achieve rugged status, and make interesting reading.

Name	Source	Details	Read it at
MIL STD 810	US Department of Defense	Thousands of pages detailing tests for almost everything from vibration during road transport to surviving salty fog or incoming missiles.	dtc.army.mil/navigator/
MIL STD 910D	US Department of Defense	A naval spec, features the infamous barge test, where computers destined for use at sea are placed on a barge while depth charges explode around it.	901d.com/index_[illegible]
IP ratings, aka EN 60529	European Committee for Electrotechnical Standardisation	IP stands for 'Ingress protection,' and these standards define and rate devices for their ability to repel solids and liquids, or survive impact.	cenelec.org
IEC 60079, 60529, 61241	American National Standards Organization and the Instrumentation, Systems, and Automation Society (ISA)	Standard 60079 explains how to build electrical devices to work amid explosive gases, 60529 offers standards for designing enclosures to withstand events ranging from corrosive winds to explosions and 61241 deals with the thorny issue of combustible dust!	[illegible] ansidocstore/

The coldest, whitest place on earth

If Jon Lawrence ever threw a slide night, it would be simultaneously fascinating and deadly dull.

The fascinating part would come from the University of New South Wales research fellow's favourite travel destination: Dome C, a scientific base 900 km from the Antarctic coast where he works on the Automated Astrophysical Site-testing International Observatory (AASTINO). Dome C is best reached by air: the annual supplies convoy can take two weeks to grind its way over the ice to bring a year's worth of food and scientific supplies.

The deadly dull comes from the fact that Dome C is probably the coldest, whitest place on Earth and there's nothing to see except snow, the sky and one or two migratory birds a year. Winter temperatures regularly plunge to -90 degrees Celsius. In summer, three months of unbroken sunshine can see temperatures soar to a balmy maximum of -20.

Unbelievably, when the temperature hits these dizzy heights, it causes trouble for AASTINO's computers. AASTINO's job is to collect data on Antarctica's suitability as a location for a new telescope, and the experiment's heart is a collection of custom computers based on PC 104 components. The computers take telemetry from its various instruments and transmit them through a LAN based on a commercial Ethernet hub, and then send them to a supervisor machine that forwards the results to UNSW via Iridium satellite phones at an anemic 2400 kbps.

Most computers would die within minutes in this environment, but Lawrence manages to keep several working within the confines of AASTINO's green hut, which uses its fibreglass skin and polyurethane spray foam to provide insulation and keep out the snow.

Heat and power comes from a Sterling Engine, a special type of motor that does not vent hot gas like an external combustion engine. Sterling Engines burn jet fuel, but re-use as much heat and gas pressure as possible to generate more heat and power. They are also quiet, use little fuel and are mighty reliable.

'Ten years ago we used thermo electric generators,' Lawrence recalls. 'We had problems with coolant leaks and ice in the exhaust.' And with just a handful of people wintering at Dome C, '[they] saw the need to start again with something more robust.'

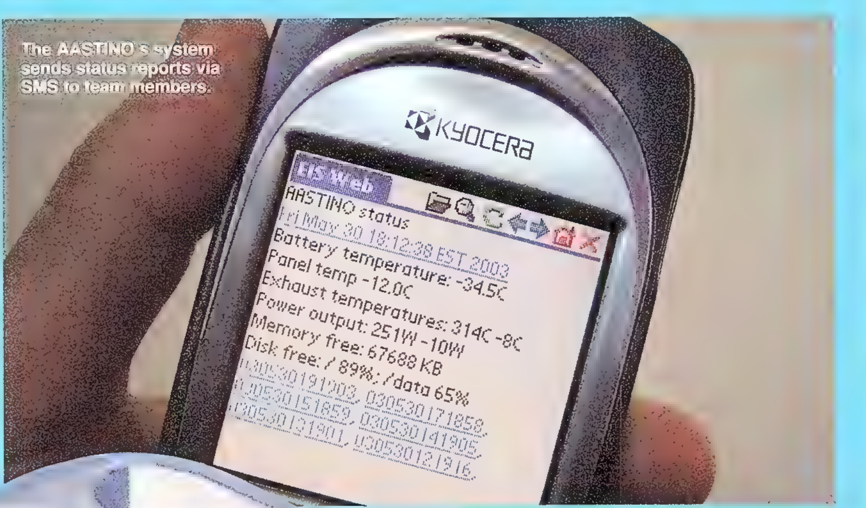
Lawrence acquired commercial Sterling Engines from New Zealand company Whispertech 'pulled them apart to run in this environment,' and now uses them to provide power for AASTINO and its computers, plus heat to make their environment just that little more pleasant.

'When it is minus 80 outside the engines generate enough heat to give 40 or 50 degree temperature differential,' Lawrence says. But once the temperature climbs to minus 20, the risk of overheating kicks in.

To ensure reliability, all of AASTINO's components are rated for extreme cold. No conventional hard drive could survive this environment, so Lawrence uses hardened Flash drives instead. The UNSW team also builds special wind-and-ice-proof housings for instruments, which are tested in special freezers that reach -90 Celsius. The supervisor computer monitors the availability of power, regulates its flow and controls temperature by adjusting ventilation.

All kit is housed in standard 19 inch racks, and the system fires off hourly status reports as an SMS to an AASTINO team member, who can manually adjust temperature settings if required.

It's a rig Lawrence is proud of and one that will soon feature in the Australian Journal of Electrical and Electronics Engineering. In 2005, it will get its first year-round custodian. AASTINO personnel will endure Dome C's nine month winter and ninety-plus days of total darkness for the first time this year, probably the most extreme job in computing!


The AASTINO's system sends status reports via SMS to team members.

```
AASTINO status
Fri May 30 18:12:38 EST 2003
Battery temperature: -34.5C
Panel temp -12.0C
Exhaust temperatures: 314C -8C
Power output: 251W -10W
Memory free: 67688 KB
Disk free: / 89%; /data 65%
030530191203, 030530171858,
030530151859, 030530141905,
030530131901, 030530121916,
```

Tough machines in industry

Wet ones!

Factories are dirty places. Machines can spurt superheated high pressure oil onto a computer or simply shake the life out of it. Environments like industrial kitchens are subject to regular sprays of water from high pressure hoses.

So how do you get a computer to work reliably in these spaces?

Sydney company Amtex set out to create a machine that could survive and win the IP65 rating that signifies it is impervious to dust or moisture.

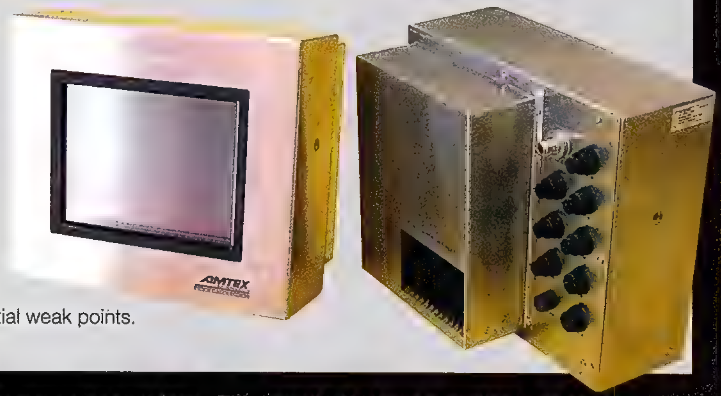
'We selected a stainless steel case to meet the requirements of the food industry,' says the company's engineering manager Luis Machin. The case was custom made, closed with industrial sealants to moisture-proof the case and then tested in a vacuum chamber to prove its integrity. Self conforming gaskets, which are typically used to seal oil sumps in cars, helped seal the unit, while specialist waterproof plugs from UK company Bulgin protected I/O ports.

Power then raised tricky issues. 'In most of these environments sometimes there are voltage spikes so you need to make sure the serial ports are isolated or you will destroy the motherboard,' Machin advises. The right power supply is important too. 'To be reliable, a power supply should only be asked to supply 70 percent of its capacity, and if you put it on the inside of the housing, it creates too much heat.' Too much heat makes it impossible to include an LCD display in the case. And LCDs are the preferred industrial solution because touch screen models remove the need for a keyboard and mouse – potential weak points.

An external power supply did the trick, but meant more sealing. And even with the power supply on the outside, heat was a problem that needed resolution through the use of internal heat sinks and a thermoelectric device to conduct heat to the outer skin of the machine.

All of these measures delivered a machine that has won IP65 rating and impressed machine surviving field trials.

'These people are very rough,' he says. 'I think we have done well to survive.'



a barge, dragging it out to water, and setting off depth charges around it. Machines designed to survive pressure are put in pressure chambers and cooked at five or more atmospheres while immersible computers are hosed non-stop for an hour with high-pressure hoses. If they fail, it's back to the drawing board.

In Australia many of these tests are performed locally. Queensland's government operates SIMTARS, which tests solutions for the mining industry, while Defence's Land Engineering Agency also performs ruggedness tests. Commercial operators like Sydney's Vipac, or Comtest and Austest laboratories, are also happy to take on testing work.

And just what does it take to become a hardcore hardware tester?

'The basis of what we do is good, solid computer skills,' says Begbie. 'Mechatronics is quite a handy qualification and Computronics is a buzzword course right now. But you don't need full blown electrical engineers in this industry.'

All of which means that overclockers and case modders might not deal with life and death situations yet, but may be setting themselves up to do so in future, should they so desire. And if that means working on extreme computers is a possibility for those with decidedly COTS skills, it seems only appropriate. Afterall, what could be more fun than designing and testing the ultimate in badass tough machines?

Barges of boom!

The most accurate way to test how well computing gear can survive extreme conditions, such as wartime deployment, is to subject them as close as possible to these conditions. When it comes to testing how well gear can survive explosive detonations, such as those in a maritime war zone, you've really just got to stick them in a barge and set off depth charges and see how they fare. Clearly, this is both an extremely fun pastime and a good way to weed out choice components for your next upgrade.

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Tough machines in space

The final frontier

Venture a few hundred thousand kilometres beyond mother earth's atmosphere and temperatures drop to about -170 Celsius. Solar winds blow plasma at over 400 kilometres/second and electromagnetic radiation buffets you from every direction.

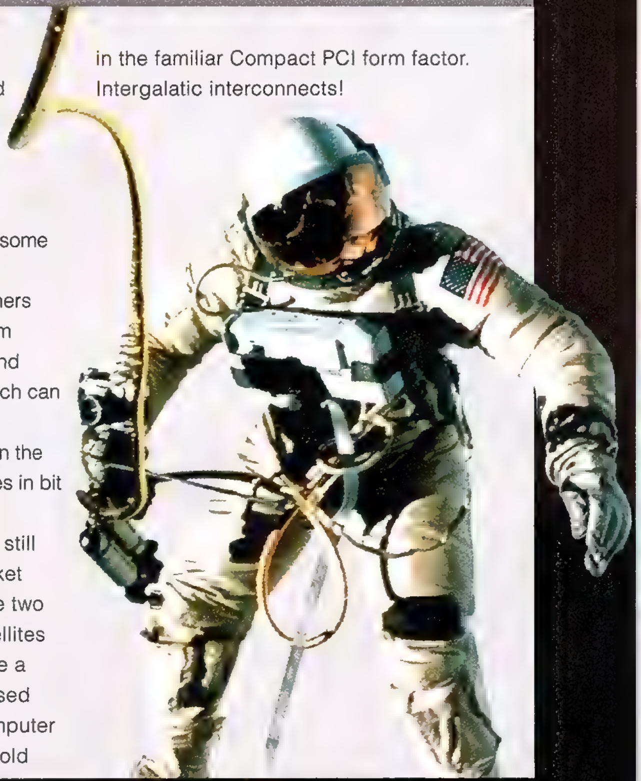
These elements will destroy an unshielded computer, so designers have created an array of covers and shields that deflect radiation away from components. The use of these coverings is planned precisely by plotting the exact location of an electronic device relative to a spacecraft's overall radiation shielding, which is often made of aluminum. Every component is therefore shielded according to its specific location and performance requirements after extensive modelling of the likely radiation present in a satellite's intended orbit or a deep space mission's trajectory through the solar system.

To help the shields, most space computers also pack many extra capacitors and resistors so that extra energy from radiation is absorbed and stored instead of heading straight for a component and zapping it. And of course space computers use non-volatile memory and hardened components that can survive the fearsome shaking of launch.

Yet even with this shielding, designers fear a 'single event' in which a random particle or radiation impacts a chip and changes the value of a single bit, which can crash many operating systems.

The answer is to include software in the OS that monitors unexpected changes in bit values and reacts without crashing.

Amazingly, all of these tricks are still applied to equipment that isn't rocket science. Spirit and Opportunity, the two Mars Rovers, and hundreds of satellites and other deep space missions use a BAE Systems RAD6000, a ruggedised version of the IBM RS6000 minicomputer powered by a PowerPC CPU and sold in the familiar Compact PCI form factor. Intergalatic interconnects!



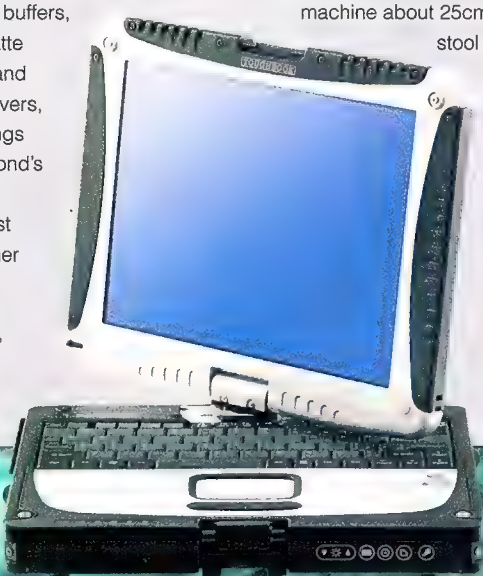
Own your own tough machine!

Interested in owning and using your own tough PC? We are, so we road tested one of the more accessible pieces of ruggedised computing kit: Panasonic's (**www.panasonic.com**) Toughbook CF-18, a mean and lean notebook computer equipped to meet the MIL-STD-810 standard that you can buy off the shelf for the pocket change value of just $5999.

The Toughbook CF-18 impresses as soon as you remove it from its box. With its grooved plastic buffers, hinged handle, matte magnesium case and chunky I/O port covers, it looks like it belongs bolted to James Bond's mountain bike.

Naturally, our first thought was whether or not this baby could live up to its name. 'Toughbook' almost begs to be run over with a car, cooked in an oven, or thrown into the backyard lion pit. Unfortunately, Panasonic doesn't guarantee these sorts of extreme conditions for the CF-18, but it does do so for a workhorse operating environment which includes dropping onto hard surfaces or even being submerged in water.

So just how tough is a Toughbook? We tested it by running Windows Media Player and firing up the pre-installed David Byrne tune. We then 'accidentally' dropped the machine about 25cm off a toddler's stool and the song kept playing without missing a beat. Emboldened, we nudged it off a coffee table, a drop of about 40cm, again without a hitch. The kitchen bench was next, and the machine again survived the 75cm tumble onto the hardwood below, although by now the meaty thump of its landing drowned out the still-uninterrupted music.



Not to be defeated, repeated accidental droppings occurred inside and out on wood and tile surfaces, while slips of the hand caused random bashings in to stone bench tops. Almost to our dismay, it showed no signs of being bothered.

The machine took to our wet test like a duck to water. Hurl a glass of water at its screen and keyboard and the liquid drains away without any hassles or disruption. We reneged on the beer spill test, preferring instead to drink the liquid allocated for testing.

Our only complaint with the machine was its lack of an optical drive, an understandable but frustrating omission.

The Toughbook oozes cool factor. We took the machine on a road trip and it caught the eye of every random that crossed our path. We also took it to parties, where it proved that it can be the life of the party and survive it unscathed, as well. Ultimately, impressive!

Lord of the Rings – the source code for role-players the world over – has become the most successful film trilogy of all time.

secret life of GEEKS

Do you read stories about geeks and internet junkies and wonder why the stereotypes are so far off the mark? **Sarah Stokely** blames really bad PR.

Like just about every subculture before it, the trappings of geekdom have gone mainstream. Ten years since the world wide web gave the internet to the masses, every school girl seems to have an iPod, a blog and MSN messenger. US presidential candidates use blogs as election tools. Tolkien's *Lord of the Rings* – the source code for role-players the world over – has become the most successful film trilogy of all time.

So why do the stereotypes about geeks remain so negative, and so dated?

The media lie

Mainstream society has jumped on the user-friendly aspects of IT, while still deriding those enthusiasts who create, maintain and popularise technology.

An article in the Australian recently screamed 'Graduates fear "geek" label' when reporting on a Victorian survey of teen attitudes towards the IT industry. It was a catchy if misleading headline that gave the impression that teenagers believe an IT degree will see them turn into Dilbert-esque cubicle drones, or sprout horrible bleach blonde braids like Matthew Lillard in *Hackers*, because naturally, that's what geeks look like.

But that wasn't quite the case. The study didn't ask the students – as the headline suggested – whether they thought they'd be called geeks if they did go into IT. It did reveal that 59 percent of the students polled thought a job in IT would mean 'being stuck in front of a computer all day' while 51 percent thought that an IT career would be 'very boring'.

So where do these negative impressions come from? Recent media coverage of computing and online behaviour seems to focus on the social isolation of net users, and the rise of internet addiction.

In fact, a recent article from Hong Kong that ran in the *Sydney Morning Herald* appeared to blame net addiction for everything from teen acne to shortsightedness.

'Anthony Chan betrays the tell-tale signs of his addiction: his skin is pallid and covered in spots, he sits nervously hunched, peering to correct his blighted vision and he has trouble communicating with friends and family,' reads the article by Stephanie Wong.

The parents of the 16-year-old 'internet addict', like a third of the 1,002 parents surveyed by Hong Kong's Polytechnic University, say their child is 'virtually addicted'.

Their son, not surprisingly, tells a different story: 'The computer is my friend, it's my life, my social life.'

But the many forms of social communication enabled by the net – usenet, forums, instant messaging, blogging – which this comment alludes to are glossed over by the reporter, who goes on to say: 'A basic function the net was invented to assist has been lost: the art of human communication.'

Reading his parent's lament, one can't help but wonder if somewhere along the line the distinction between 'my child is not communicating' and 'my child is not communicating *with me*' has failed to be drawn.

The notion that young people who spend time on the net or playing games are recluses with poor social skills and no life in the real world does not ring true to geeks who have been communicating via BBS, usenet, IRC, instant messaging and blogs – not to mention email – for over 10 years.

Peter Jackson is god's gift to geeks. Here he sizes up the giant rubber tank he will use to take over the world.

All your base

As with any other social group, these online communities have evolved their own language and social conventions. These can be as sophisticated (or retarded) as the people they attract. While some online forums may be dominated by flaming, ego-tripping and '1337-speak', others have gently enforced codes of conduct, introduced to newcomers via voluminous FAQs and virtual *hugs*. Where you interact, how and with whom is up to you.

The online language of geeks is often based on humour and in-joking. Perhaps it's the rather untranslatable humour at the base of a lot of geek slang which helped give rise to the stereotype of geeks as loners or lacking in social skills.

Common mistyping gave rise to 'teh' and 'pwned', but try explaining to a non-geek why 'I'm using teh internet' is a humourous putdown to a newbie, or why a Google search for 'pwned' turns up a badly Photoshopped image of Darth Vader standing over a bunch of fallen Rebel soldiers.

'l337-speak' is another example. The stereotype of 12-year-old gamers who use 1337-speak to taunt their in-game opponents with such conversational gems as 'd00d, UR gay' and 'owned' has itself become a phenomenon ripe for ridicule by others in the gaming community.

A lot of geek language evolved from keyboard shortcuts or programming terminology. 'LOL' is a classic example, while '/rant' was a popular signoff on Usenet posts for a while. Other sources for slang include tech support jargon such as PEBKAC – 'problem exists between keyboard and chair', ie. the user. Given the technical derivation of these words, they'll probably never move into common vernacular.

However, as email and online chatting has become a popular mainstream activity, some geek language has translated into everyday use. Smileys (or emoticons) evolved to give a bit more expression and emotion to email and text-based chat, and they are now so widely used that most mobile phones ship with a handful of smileys pre-programmed into their SMS libraries.

The rapidly evolving nature of computing and internet technology explains why a lot of geek language and humour also moves quickly to reflect the changing technological terrain. And as technological advances have changed the ways geeks interact online, geeks have also found new ways to use the internet to arrange their 'real life' social lives.

Geek meet

Making contact online has long been a gateway for people to find likeminded souls to chat with or meet, based on any number of shared interests. Often online communities offer a way for people to break the ice socially, or to overcome geographic or social isolation.

Apart from local meets or munches that allow members of particular online groups to get together, many festivals and conventions have their roots in online communities.

The online fandom phenomenon has also taken off in recent years, with worldwide social groups springing up based around shows like *Buffy*, *Star Trek*, *Stargate* and the *Lord of the Rings* films. Zealous updates by NZ-based fans helped fansite **www.theonering.net** which began in the early days of the filming of the trilogy, eclipse the official New Line Cinema site in popularity.

The rise of blogging in the past couple of years has also seen new ways of meeting evolve. The popularity of blogsites such as LiveJournal, which hosts over four million accounts, has given birth to spin-off sites such as **www.meetup.com**, which is a tool designed to help online community members organise and advertise real life gatherings.

But probably the classic example of a geek meet-up is the LAN party. From humble beginnings in university computer labs or the lounge rooms of groups of friends keen enough on gaming to lug their computers to each other's houses, LAN gaming has evolved to become big business and something of a social phenomena in places like the US and Korea (where LAN competitions air on TV).

These events are often sponsored by hardware manufacturers keen to have their products seen and endorsed by the gaming community. Indeed, some LAN champions have cashed in on their crowns by endorsing hardware or joining the marketing teams of hardware vendors.

But the commercial cash-in on gamers and the sometimes breathtaking amounts they'll spend on computer hardware hasn't taken off particularly well in Australia, where most computer gaming businesses are jumped-up internet cafes.

LAN events like the World Cyber Games will draw a couple of hundred people keen to meet up with their clan members, show off their latest case mods and maybe win a ticket overseas to compete at the world finals.

But LANs organised within the gaming community are still popular. For example, *Atomic*'s own fourth birthday LAN was celebrated in Melbourne this year. The glue that keeps these community-run events together is the essentially social nature of computer gaming – both online and at LANs.

Massively multiplying

While the stereotype of LAN gamers is of teenage boys drinking Coke and giggling as they frag each other in 80-minute Instagib Quake 3 matches – or trade warez at the less game-oriented LANs – the gaming community has evolved far beyond that.

Game communities often involve the creation and sharing of user mods, the most famous of which is Counter-Strike. The rise of MMORPGs has added another facet of social

A healthy geek diet consists of large quantities of the above items – the book included.

interaction to online gaming, allowing – and sometimes forcing – players to team up to defeat in-game challenges or battles.

The social aspect connects players to games, as well as each other. Many games owe their enduring popularity to the gaming communities that have sprung up around them. And many clans continue to game together even when they've moved on from the original game which brought them together – for example Counter-Strike clans that have evolved into guilds in World of Warcraft.

The popularity of PvP gaming has certainly influenced the direction in game development – for example when the popularity of Quake 2's multiplayer game pushed the designers of Quake 3 to forego a single-player version altogether. Games these days can live and die on the success of their multiplayer offering. But with the rise of massively muliplayer online games, online gaming seems to have opened up the social aspect of video entertainment far beyond the relatively small number of gamers who participate in LANs. Now anyone who likes the look of EverQuest 2 or World of Warcraft can venture into the online gaming community without leaving the house.

These are just a few examples that show the net is often an enabler of social activity, used by normal people who are no more or less outgoing and socially active as anyone else. So where are the stereotypes coming from?

Fame and fortune

Perhaps it can be boiled down to something as simple as bad PR. After all, if geeks really are couch-dwelling introverts who never leave the house or their keyboard if they can possibly help it, they're not going to be out singing their own praises from the rooftops, now are they?

So perhaps it's inevitable that the thousands of kids who demanded an iPod for Christmas have probably never programmed anything beyond the speed dial on their mobile phones.

They won't know that the world's first webcam was brought into existence because the computing boffins at Cambridge University wanted to save themselves a trip to the tea room if the percolator was empty.

They probably have no idea who Steve 'The Woz' Wozniak is, and how his work with the much more famous Steve Jobs brought the Apple computer into being. After all, they probably only know Bill Gates through the telemovie 'Pirates of Silicon Valley'.

But they do know about geeks who have broken through the 'geek ceiling' and become famous – people like Peter Jackson – arguably the most acclaimed nerd walking the Earth right now.

...people like Peter Jackson, arguably the most acclaimed nerd walking the Earth right now.

As you walk through the *Lord of the Rings* exhibition at Sydney's Powerhouse museum, the notion that Peter Jackson is an enthusiast who toiled away doing what he loved until the world took notice is made very clear.

The exhibition features intricately decorated costumes, weapons and armour for the various races of Middle Earth, with massive detail right down to the individual chain links of mail armour. A fantasy world created with the type of trainspotter's obsession with accuracy and detail which will probably be familiar to anyone who has ever immersed themselves in the Tolkien-derived genre of roleplaying or computer RPGs.

While role-players and role-playing remain deeply uncool in the mainstream, Jackson – who began as a DIY filmmaker at the age of eight and baked latex models for his early movie *Bad Taste* in his family's oven – struck a chord with the moviegoers of the world, by bringing his vision of the rich fantasy world of Tolkien to the big screen.

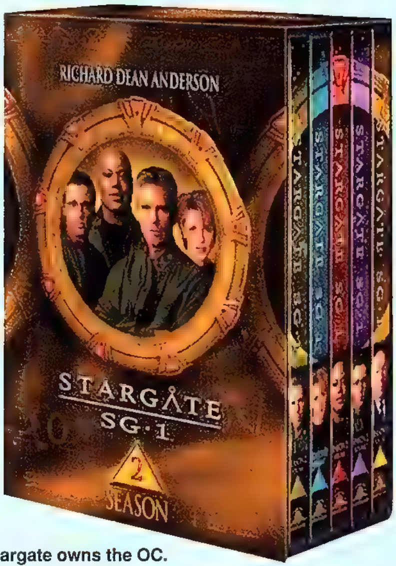
While the cliché of the gamer geek is of a slacker who goes nowhere beyond his keyboard or PS2 controller, there have been plenty of real life examples of people turning this stereotype on its head. People like John Romero, who gave us Doom before crashing and burning with Daikatana. Or the lesser known Drew Angeloff, who was a Duke Nukem champion before joining Microsoft as a tester and becoming one of the team which created the Xbox console.

One novellist who credits both role-playing and computer games with developing his creativity is Melbourne-based Cameron Rogers, whose novel *The Music of Razors* was shortlisted for a record-breaking three accolades at the 2001 Aurealis awards for science fiction, fantasy and horror writing.

Rogers credits role-playing games with fostering his ability to breathe life into people and stories through his writing.

'My friends let me know if they were bored,

the secret life of geeks



**Stargate owns the OC.
End of discussion.**

and they let me know if what we were doing rocked. In that sense it was a fantastic school for me. I learned very damn fast what worked, and what didn't, how to pace a story, the whole shebang.'

Rogers has several new books appearing this year, including a children's book *Nicholas and the Chronoporter* (published under the pseudonym Rowley Monkfish), and the novel *Fateless*, due late this year.

But he admits that there is a downside to playing games. 'Much as I love them, they have been a very real drain on my actual productivity. World of Warcraft has me firmly in its grip at the moment.' Something we can all relate to!

Other artists use the net as their main promotion tool. Cutting out the middle man enables direct contact – and direct sales – for artists who already have an existing fanbase. Les 'Fruitbat' Carter (former guitarist of 1990s indie pop band Carter USM) self-publishes and promotes his new band Abdoujaparov online.

Another example is Randy K. Milholland, the creator of online comic strip Something Positive, who turned pro last year after fans donated the equivalent of his US$15,000 salary in response to his offer to dump his day-job and write fulltime if they stumped up the cash.

A global community

But the beauty of the geography-effacing, social networking tool that is the internet, is that it's not just the celebrity geeks who make their mark. There are numerous examples of geek achievers who, through their work as volunteers, their hobbies or their professions, have broken the mold and defied the stereotype of geeks as loners who talk more to computers than people.

Beyond one-on-one social interaction, the internet has allowed for fast, global communication between interest groups both serious and frivolous. Through individual blogs and collective news and information sites like **www.indymedia.org** and **www.wikipedia.org**, the net has become a way for news, facts and opinions to be broadcast worldwide.

The community-based indymedia project encourages people around the globe to share news in realtime using the net. The IT origins of this now international grassroots news community lie in Australia, in a group called C@talyst and a man known as Predator.

Mike Carlton – known online as Predator – was a geek activist and open source advocate whose interests in computing, science and political activism combined to see him found Sydney's underground exploring Cave Clan community, as well as co-founders C@talyst, an activist collective that provided IT services for other activist organisations across Australia.

Predator died last year of cancer, aged 33. Geeky to the last, he ended his blog: 'Broadcast message from root@pred: Sending all processes the TERM signal.' But according to one tribute posted by a user known as Rana on the Perth indymedia website: 'His impending demise didn't faze him at all – he told me he was happy to be witness to the open source revolution and didn't want to stick around when the world went to shit from [a] lack of petroleum anyway.'

There are many other examples of community-minded geek ventures, such as the distributed computing project SETI@home. The open source operating system Linux, started by software enthusiast Linus Torvalds, is probably the most well known.

But whatever brings geeks together – be it a shared interest in programming or gaming, or just a desire to chat – it's become far more than just a shared interest in computers. Geeks have created their own culture, language and humour. The secret life of geeks.

It's hit and miss when mainstream culture tries to adopt geekisms (who didn't cringe when they watched *Swordfish*? Or Sandra Bullock in *The Net*?), but technologies like mobile phones and the net have become a part of daily life. So who knows how much longer before the secret life of geeks goes mainstream too. Stay tuned and maybe the next time George W. Bush invades another country he'll stride in, arms raised in victory, shouting 'Owned!'.

And they think geeks are scary.

Stars of geek culture

HOT

Peter Jackson
Co-writer and director of the *Lord of the Rings* trilogy

Linus Torvalds
Creator of Linux, leading light of the open source movement

John Carmack
Founder of id Software, lead programmer, Doom 3

'Gooseman' Minh Le & 'Cliffe' Jesse Cliffe
Counter-Strike mod creators

Brad Fitzpatrick
Creator of **www.livejournal.com**

NOT

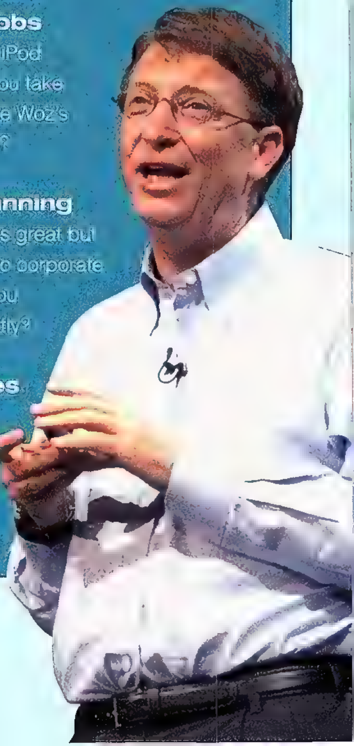
John Romero and Stevie Case
You're only as good as your next game

Jeff Bezos
Founder of Amazon.com, now reviled for the one-click patent

Steve Jobs
We like the iPod but didn't you take credit for the Woz's innovations?

Sean Fanning
Napster was great but selling out to corporate land took you where exactly?

Bill Gates
Vocal opponent of open source



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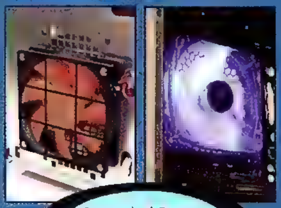
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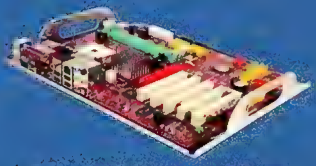
Inside Structure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Truth in tech

'Aye, *Warp Core Monthly* has nothing on *Atomic*.'

– Chief Engineer Montgomery Scott

Somewhere on a large but pretty mountain, in a really far away and exotic country sits a guru, all white, bearded and wise. He's a special type of guru, one who explains the mystery of cable and chip, of power and performance. Peasants come to him and say 'Oh great massively bearded one, my Dell Inspiron Eleventy Bi lion is running like a slack-bottomed mule dragging its hooves over a field of dung. How can I make it faster, add a new case fan, and tweak Windows so it will not crash on me and taste like rotten fruit?' To which the guru will pause, wisely as he does, before reaching behind him and sagely pulling out a copy of *Atomic*. Then, with the gentle movement of a practiced master, he leans forward, hands it over, and looks into their eyes like a hawk-eyed hawk, before simply saying 'Read *Technique*'. He then chuckles inanely as if he cracked an awesome funny, and the person leaves, reads, and is forever changed. Such is the power of *Atomic*. True story. - *Ed*

tutorialcontents

Windows **64**

It's never as good as when it's from the command line, and this month Craig Simms shows you just how sweet and sexy command line goodness can be. So if you so far haven't mastered the Windows command prompt, let this month's tutorial be your guide!

Linux **68**

It's all well and good to overclock your baby to oblivion, but you need to keep tabs on temperature if you're to use it for any sort of computing application. This month Leigh Dyer shows you how to install and make use of the Linux lm_sensors so you know just how hot your box really is.

Hardware **72**

Last month saw Ron Prouse start work on the ultimate quiet PC with nothing but blind ingenuity and a lot of stuff that makes noise go away. This month Ron shows you how to finish the super silent project and, if you're too lazy to do it yourself, enter a comp to win Ron's creation!

If you have any suggestions for topics you'd like to see covered in Technique, drop us a line at **tutes@atomicmpc.com.au**

tinytweaks

Mounting matters

If you want to mount a hard drive volume or partition to a folder rather than a drive letter, here's how. Go to Start –> Settings –> Control Panel –> Administrative Tools –> Computer Management, and select Disk Management from the left-hand menu tree. Right click the volume (or partition) that you wish to mount, and select the 'Change Drive Letter and Paths' option. Click Add, and either manually enter the path in the bottom field or click on Browse to select it through the GUI. You can even remove an existing drive letter to make a drive completely transparent to the end user. Although you can add as many paths as you want (which is useful for the extreme power user), there seems to be no easy way of mounting a network mapped drive to a folder – yet.

GNOME terminals

The mix of text consoles and graphical file management on Linux can often become awkward to deal with, but the GNOME desktop has a handy tool to bring the two worlds together. It's called 'gnome-open', and you can use it from a terminal to open any file as if you'd double-clicked on it in Nautilus. For instance, this command opens a file in your preferred PDF viewer:

```
gnome-open PARTS.pdf
```

This also works for folders, opening in Nautilus: **gnome-open ~/Pictures.**

Or to open a view of the current folder: **gnome-open.** You can open terminals from Nautilus windows as well by installing an 'Open Terminal Here' script from **g-scripts.sourceforge.net**. Copy the script to ~/.gnome2/nautilus-scripts/, making sure to set the executable bit on them.

Spit and polish

Cutting windows or fan holes in a steel case does not mean you have to repaint the panel to avoid the bare metal going rusty, as long as you have been relatively careful during the cutting phase and haven't gouged too much of the surface away. The answer is only as far away as your sister's / mother's / girlfriend's / wife's beauty case. Clear nail polish is perfect for sealing cut edges on steel, and the best part about it is that the bottle comes with its own small brush to apply it with! The main thing is to clean the surface thoroughly first, either using isopropyl alcohol or a non-greasy solvent such as methylated spirits. Remember, if the cuts are too messy you can always cover up a myriad of sins by using split rubber edging, glued around the hole with either silicone or super glue.

Command & Conquer Part 1

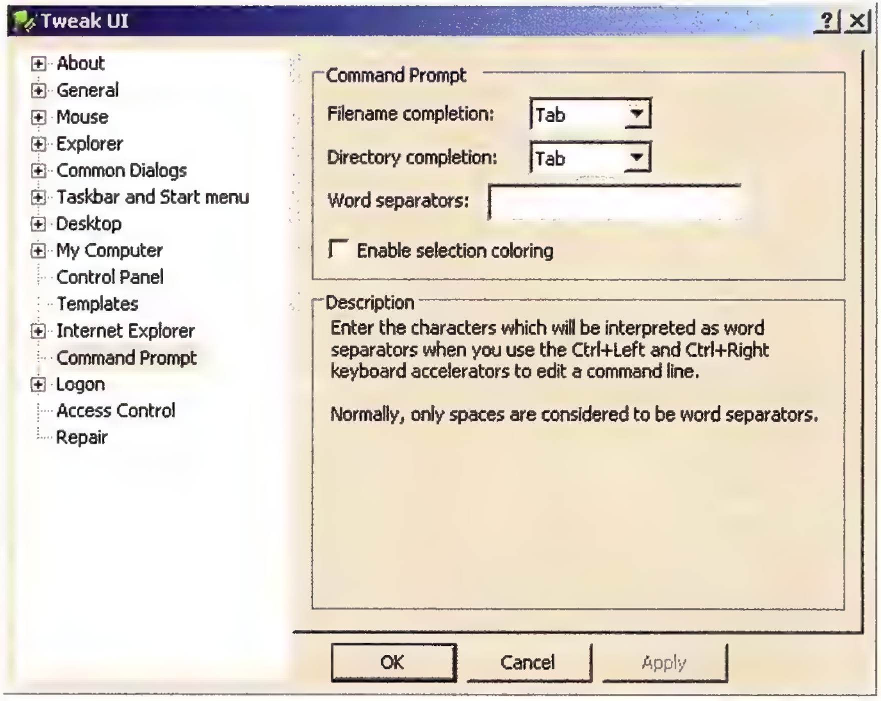
The Windows command line isn't dead yet. Nor is **Craig Simms**, despite pasty white skin and fear of sunlight. We locked both in a room to see what would happen, and got this tute!

It is the time before Start buttons. The user stares intently at a black screen that is littered with white text, wondering which seemingly random combination of values will eke the most out of a possible 640KB of base memory in order to play the game of the moment. Is it HIGHMEM that's the problem? Or EMM386? If the sound driver was sacrificed it would be easy, but that luscious 8-bit sound...

If you're a member of the post-Windows 95 generation, there's a chance that you have no idea what we're talking about – unless you've dabbled with x86 emulators like DOSBox or VirtualPC to get some old games running properly. Thankfully the days of manually configuring a system on a per-application basis through the command prompt are (for the most part) gone, as Windows does all the work for us.

So why does Microsoft still include a Command Line Interface (CLI) with Windows if it is, for the most part, obsolete? Because as Linux users will tell you – nothing beats a command line for flexibility, speed and power – especially when it comes to file management. That, and using the CLI makes you a seriously hardcore, and undeniably sexy, geek.

Though we'll have to wait for Longhorn and its new CLI (codenamed Monad) to get the same level of scriptability as equivalent *nix prompts, the existing command prompt still packs quite a punch – as we'll get into now.



Command Prompt

Filename completion: Tab

Directory completion: Tab

Word separators:

☐ Enable selection coloring

Description

Enter the characters which will be interpreted as word separators when you use the Ctrl+Left and Ctrl+Right keyboard accelerators to edit a command line.

Normally, only spaces are considered to be word separators.

▲ **TweakUI had an interface overhaul late last year. It can tweak several areas of Windows, but what we're interested in is filename and directory completion for the command prompt. Who knew prompts could be so sexy?**

Catching up

You're reading *Atomic*, so we're going to assume you already know a bit about the command prompt. You're probably familiar with stuff like: dir, cd, mkdir, rmdir, del, ren, copy and move. And you know about * and ? wildcards, and that most commands followed with /? will give you help and options relevant to that command. So first, lets make navigation a little easier.

Before we even open a command prompt, we're going to do a little tweaking, so head over to **www.microsoft.com/windowsxp/downloads/powertoys/xppowertoys.mspx**, download TweakUI from the right-hand panel and install it. Load the program and choose Command prompt from the left-hand menu tree, set Filename Completion and Directory Completion to Tab, then click OK.

Open a command prompt. Hitting Tab will now cycle through all the available files and folders one by one in alphanumeric order, while Shift+Tab will go back a step. If you're part-way through typing out a file or folder name, you can hit Tab to complete that name, or hit it again to cycle through other available names if a number of files match. For example, typing:

```
cd p
```

in the root directory of the drive Windows is installed on and then hitting the Tab key would produce:

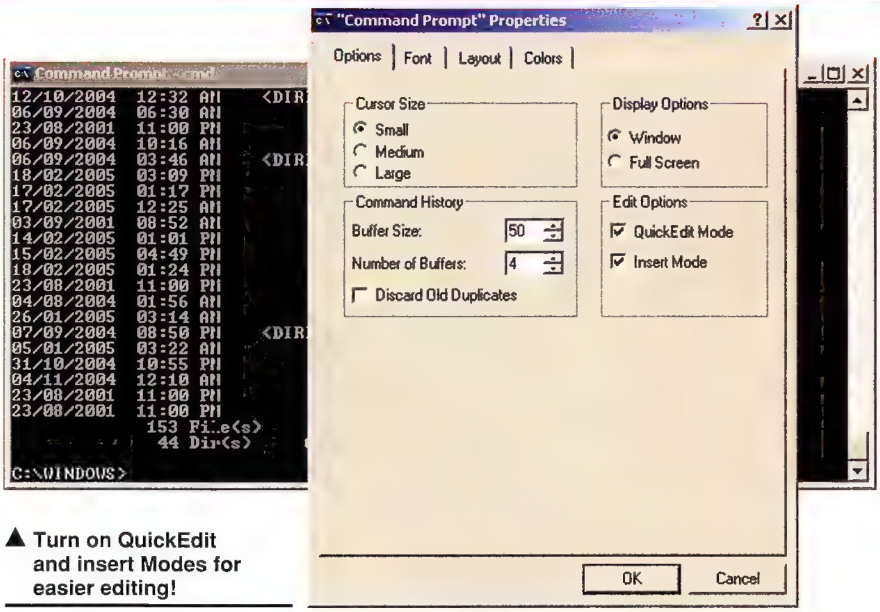
```
cd "Program Files"
```

Note that Program Files is surrounded by quotation marks. While for the most part the command prompt will handle the space between 'Program' and 'Files' just fine, some programs or commands will interpret it as a delimiter (a symbol that separates two arguments) and so quotation marks are used to define it as a single argument.

Next enable QuickEdit and Insert Mode. Click the icon at the top-left of the command prompt window and choose Properties, then check the relevant boxes in the Options tab. Click OK and choose to modify the shortcut that started the window. You can now select lines of text by clicking and dragging with the left mouse button. Right click to copy text to the clipboard, and right click again to paste back into the command prompt. Thanks to insert mode we can now also enter text wherever the cursor is, like a word processor, rather than overwriting existing characters.

Conditional processing

Conditional processing symbols allow you to run multiple commands from the one line of code. To perform one action immediately followed by another, you can use the ampersand symbol:



```
12/10/2004  12:32 AM      <DIR
06/09/2004  06:30 AM
23/08/2001  11:00 PM
06/09/2004  10:16 AM
06/09/2004  03:46 AM      <DIR
18/02/2005  03:09 PM
17/02/2005  01:17 PM
17/02/2005  12:25 AM
03/09/2001  08:52 AM
14/02/2005  01:01 PM
15/02/2005  04:49 PM
18/02/2005  01:24 PM
23/08/2001  11:00 PM
04/08/2004  01:56 AM
26/01/2005  03:14 AM
07/09/2004  08:50 PM      <DIR
05/01/2005  03:22 AM
31/10/2004  10:55 PM
04/11/2004  12:10 AM
23/08/2001  11:00 PM
23/08/2001  11:00 PM
             153 File(s)
              44 Dir(s)

C:\WINDOWS>
```

"Command Prompt" Properties

Cursor Size: ● Small ○ Medium ○ Large

Command History: Buffer Size: 50; Number of Buffers: 4; ☐ Discard Old Duplicates

Display Options: ● Window ○ Full Screen

Edit Options: ☑ QuickEdit Mode ☑ Insert Mode

▲ **Turn on QuickEdit and insert Modes for easier editing!**

dir/w & now

This command will list the contents of a directory in wide format, then immediately shows the date and time.

If you want to conditionally execute a second command based on the success or failure of a preceding command, use double symbols. A normal output counts as a success, an error as a failure.

So if you want to run a command only if the command that came before it was executed successfully:

dir *.jpg && now

Here, the 'now' command will only execute if there are files with the JPG extension in the current directory. For a failure, use a double pipe (usually created by pressing Shift + \):

dir *.png || now

The 'now' command will now only execute if there are no .PNG files in the directory.

You can stack as many conditions together as you like, and can also group them using a handy set of parentheses:

dir *.jpg && (dir *.tif || dir *.gif) && dir *.png

Here, if there are .JPGs in the current directory, it will search for .TIF files – if there are no .TIF files it will search for .GIF, and if either of the two preceding commands are successful, it will search for .PNG files.

Redirectors

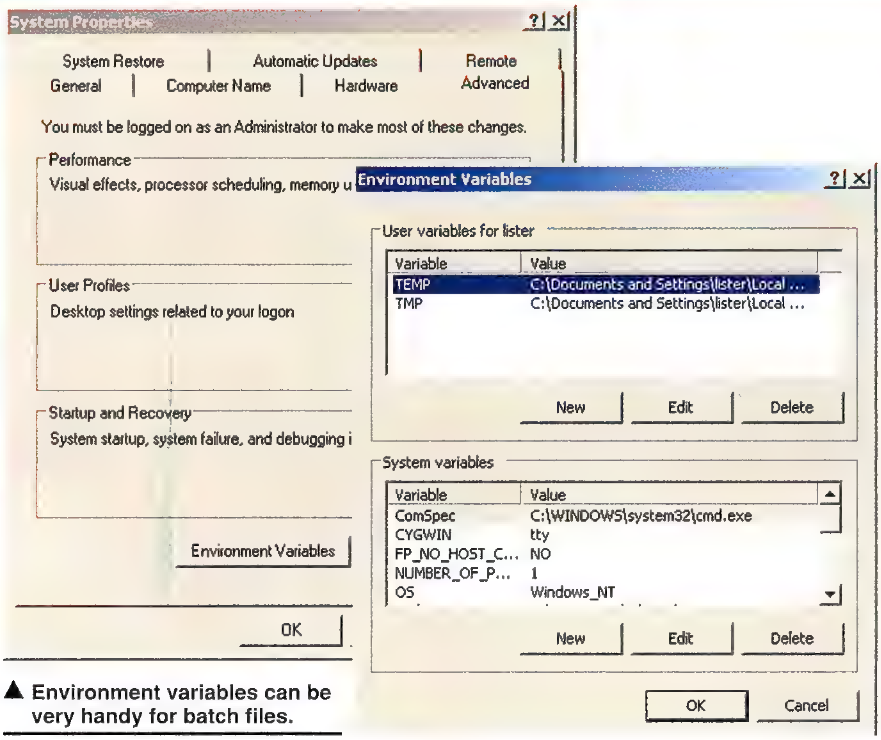
Redirectors control the flow of data, particularly to areas other than standard output.

For instance, we can send one command through another – this is known as piping, and is indicated by the pipe symbol.

Keys, wonderful keys

So now you have a beefed-up command prompt. Time to cover the finicky bits. In there interests of completion, a list of the keys that make navigating the prompt easier:

← or →	Move cursor left or right.
CTRL + ← or →	Move cursor to the beginning of next/previous word (also known as a token, which is any string after a delimiting character)
↓ ↑	Cycle up or down through previous commands you have entered.
HOME	Send cursor to the beginning of the line.
END	Send cursor to the end of the line.
ESC	Clear the line.
PAGE UP	Jump to the first command the user entered.
PAGE DOWN	Jump to the last command the user entered.
F1	Reproduce the previous command character by character.
F2	Reproduce the previous command up to the first instance of a certain letter.
F4	Delete an existing line up to the first instance of a certain letter. Starts the delete from wherever the cursor is positioned, so make sure to move it from the end.
F7	Graphical interface for selecting previous commands. Use the up and down arrows to navigate, enter to select.
ALT F7	Clear all previous commands.
F8	Command completion memory. If you've entered a command beforehand, all you have to do is partially type it the next time, then hit F8 to bring it up again or to cycle through the different variants of that command you've previously used. Works the same as the up arrow when nothing is typed, except rather than stopping at the top of the command list, it loops to the bottom again.
F9	If you know the reference number of a previous command (which is shown to you in the F7 menu), you can hit F9 followed by that number to pull up the associated command.



You must be logged on as an Administrator to make most of these changes.

Visual effects, processor scheduling, memory u

Desktop settings related to your logon

System startup, system failure, and debugging i

User variables for lister

Variable	Value
TEMP	C:\Documents and Settings\lister\Local ...
TMP	C:\Documents and Settings\lister\Local ...

System variables

Variable	Value
ComSpec	C:\WINDOWS\system32\cmd.exe
CYGWIN	tty
FP_NO_HOST_C...	NO
NUMBER_OF_P...	1
OS	Windows_NT

▲ **Environment variables can be very handy for batch files.**

```
dir | sort
```

This will send the output of the dir command through the sort command, which will then order all the data alphanumerically. To send data to a file instead of standard output, use the 'greater than' symbol (and you've likely seen this used before):

```
dir/w > list.txt
```

This will write a directory list in wide format to a file named 'list.txt'. If you run this command again, it will overwrite the previous list.txt file with new content.

So what if we wanted to append data to the end of an existing file rather than overwrite it? Then we'd use double greater than symbols.

```
now >> list.txt
```

If the file doesn't exist, it is created.

Certain commands will also accept a file as standard input – that is, the program will read in a file and interpret it as if its content had been typed into the program manually. This is especially useful for commands that have their own prompt such as sort, debug and edlin, as a level of automation can now be achieved by reading in multiple commands from a single file – making these prompt-based commands viable for batch files.

An input redirection is achieved by using the 'less than' symbol. Say you had a file called names.txt with the contents:

```
Predator
Alien
Godzilla
```

and then typed:

```
sort < names.txt
```

Sort will respond as if we had entered each line by hand, and then terminated it with the end of file character (F6, which appears as ^Z through standard output), giving:

```
Alien
Godzilla
Predator
```

Environment variables

Environment variables allow you to store a string within a symbolic name. From the command prompt, type 'set' and hit Enter to view your current environment variables.

Environment variables can be used in batch files to shorten strings, to store useful information or to provide compatibility across multiple systems.

The variable itself is the name before the equals sign, and the string after it is what the variable represents. You can call a variable by attaching a percent sign to either side of it. For example, if you type:

```
echo %systemroot%
```

It will echo back your Windows directory. Neat, eh?

There are two types of environment variables – 'system' and 'local'. System variables persist throughout all instances of the command prompt, whereas local variables will only exist during that session. You can access system variables (and the subset user variables) by right clicking on My Computer, choosing Properties, clicking the Advanced tab and then the Environment Variables button. Local variables require input through the command line. To create a local variable, use the syntax:

```
set variable=string
```

replacing 'variable' with the name of the variable you want, and 'string' with the relevant string. You can delete a local variable by setting it to equal nothing. Note that you will need to use the ^ symbol to escape any special characters (<, >, |, &, or ^) that you may include in your string.

Prompt customising

Getting tired of seeing C:\> all the time? Try this tweak. Typing:

```
prompt
```

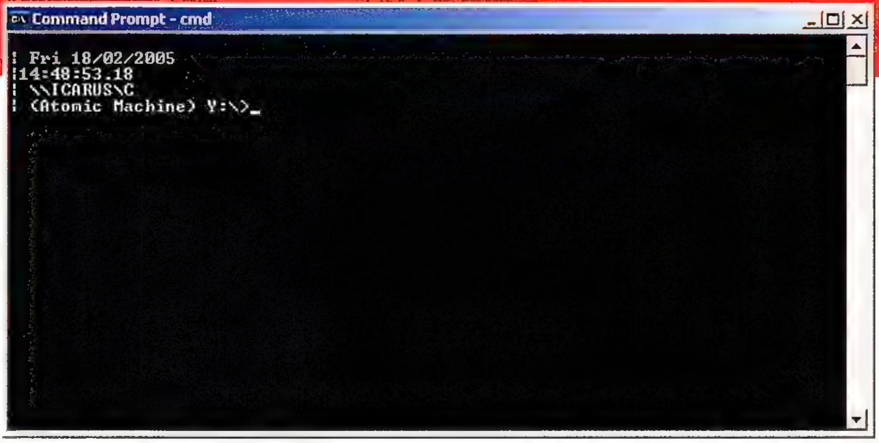
followed by an appropriate value listed below will allow you to totally customise your command prompt:

$p	The drive letter followed by a colon and backslash
$g	Greater than (>)
$l	Less than (<)
$a	Ampersand (&)
$w	Equals (=)
$t	Time
$d	Date
$f	Right parenthesis ( ))
$c	Left parenthesis (( )
$v	Windows version
$b	Pipe (|)
$_	Line Break
$e	Left arrow symbol
$m	UNC name (useful for mapped drives)
$+	Allows the entering of any string after the plus sign

A space is valid anywhere except directly after a $ sign. So the following:

```
prompt $b $d $_$b$t$_$b $m$_$b$+
(Atomic Machine) $p$g
```

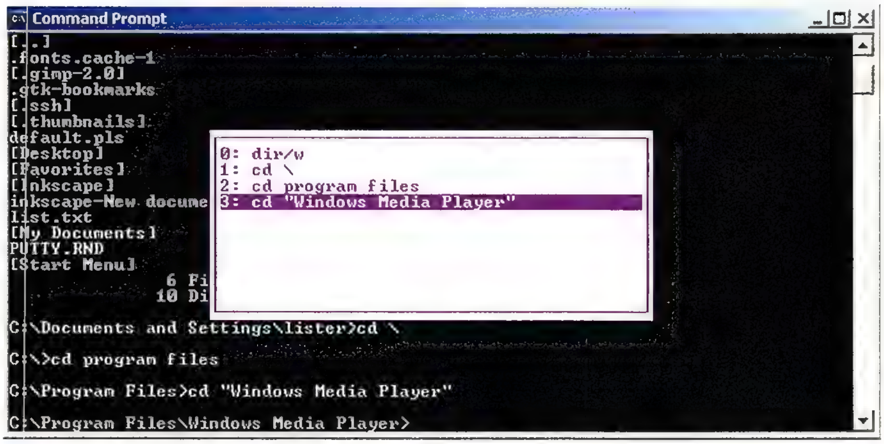
would give you the prompt in the image to the right.



```
: Fri 18/02/2005
:14:48:53.18
: \\ICARUS\C
: (Atomic Machine) Y:\>_
```

▲ You've never seen a prompt quite like this one.

To make it permanent, close all command prompt windows, right click on My Computer, choose Properties, Advanced and hit the Environment Variables button. If you want it to be active for the current user only, click the New button under User Variables, otherwise to make it available to all users, click the New button under System Variables. Enter prompt as the Variable Name, the $ values as the Variable Value and click OK. Any command prompt opened from now on will have your customised prompt.



```
[..]
.fonts.cache-1
[.gimp-2.0]
.gtk-bookmarks
[.ssh]
[.thumbnails]
default.pls
[Desktop]
[Favorites]
[Inkscape]
inkscape-New docume
list.txt
[My Documents]
PUTTY.RND
[Start Menu]
               6 Fi
              10 Di

C:\Documents and Settings\lister>cd \

C:\>cd program files

C:\Program Files>cd "Windows Media Player"

C:\Program Files\Windows Media Player>
```

```
0: dir/w
1: cd \
2: cd program files
3: cd "Windows Media Player"
```

▲ Already typed in a command? The CLI remembers all, just like my girlfriend!

Experiment with your own values, there are many and varied ways to customise the prompt to your liking. And just like your desktop, doing so personalises your working area, which you'll see a lot of if you're going to learn more about the CLI and perhaps become a CLI junkie. Not that there's anything wrong with a GUI, but who can say 'no' to all that power?

Yeah, we didn't think so.

Next month we'll explore powerful commands, useful tricks, and the versatility of batch files which, if you're interested in programming, is a great way to learn basic structures, such as conditional loops.

Tricks of the trade

Quick path

Drag and drop a folder or file from Windows Explorer into the command prompt to quickly type out its path.

Case sensitive dir

For a case sensitive list, pipe dir through find like so:

```
dir | find "Bob"
```

It will show all files that contain the string Bob, but not bob. For regular expression searching, pipe through findstr instead.

Dot names

The command prompt will allow you to create files or folders that begin with a dot, whereas Explorer will not.

Multiple Directory Management

Mkdir will happily create multiple directories if need be. Simply delimit each name with a space.

```
mkdir a b c "angry bob" e
```

Using rmdir in this manner will similarly remove multiple directories which can be very handy.

DOSKey macros

Say you want to bind a single letter to a command. Simply type:

```
doskey d=dir/w
```

From now on when you type just 'd', it will execute the command dir/w. For more complex commands using certain special characters and spaces, you will need to use the ^ symbol. For example, if you wanted to bind the letter 'd' to dump a directory listing into the file list.txt:

```
doskey d=dir/b^ ^>^ list.txt
```

To make the change permanent, right click on the command prompt shortcut in your Start Menu, choose Properties, and after cmd.exe in the Target field hit Space and then add:

```
/k %SystemRoot%\System32\
autoexec.bat
```

where /k indicates that CMD executes a command before launching. Then create a file in your Windows\System32 directory called 'autoexec.bat', open it with a text editor and enter the lines:

```
@echo off
doskey d=dir/w^ ^>^ list.txt
```

Then save and close. You can add any extra commands you wish to this file in order to execute them before the session starts.

Sensory perception

Leigh Dyer gets reacquainted with the hardware sensors on his motherboard.

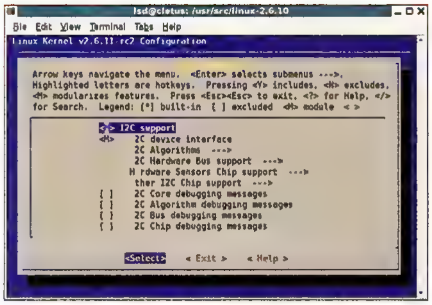
It's always a good idea to keep an eye on what's happening inside your PC, especially when you're overclocking. Temperatures inside a PC can soar on hot days, and if a critical fan stops working, it could spell doom for your CPU, video card, hard drives, or other components. Linux is not without concern for your hardware's well being though, and with a few select tools, you can keep a close eye on the health of your system, and perhaps even keep it running a bit more quietly.

Motherboard sensors and lm_sensors

Most motherboards today have some kind of sensor chip, with inputs for monitoring voltages, temperatures, and fan speeds. These sensor chips are connected to the I2C bus, or a subset of it called the System Management Bus (SMBus). Under Linux, sensor support is provided by the lm_sensors package (secure.netroedge.com/~lm78), which contains both kernel drivers for sensor chips and a user-space library and tools for reading sensor values.

There are literally dozens of apps that can read the sensor data, including system monitoring daemons that can send out alerts or even shut down the system in an emergency. We'll hold off on these for a few minutes though – we need to get the sensor modules in place first.

If you're running a recent 2.6 kernel, congratulations – the lm_sensors and i2c drivers have all been merged in to the official kernel sources, so all you have to do is make sure the modules have been built. If you're running a standard distribution kernel, they hopefully should be already, but if you're rolling your own, follow these steps:

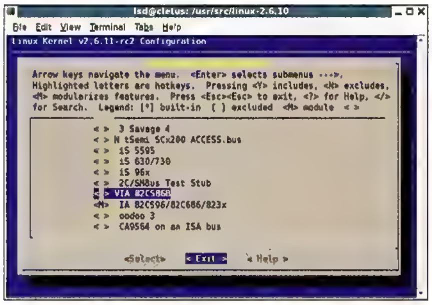


lsd@cletus: /usr/src/linux-2.6.10
Bile Edit View Terminal Tabs Help
<Select>
< Exit >
< Help >

```
Linux Kernel v2.6.11-rc2 Configuration

  Arrow keys navigate the menu.  <Enter> selects submenus --->.
  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>
  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >

            < > I2C support
            <M>    2C device interface
                   2C Algorithms  --->
                   2C Hardware Bus support  --->
                  H rdware Sensors Chip support  --->
                   ther I2C Chip support  --->
            [ ]    2C Core debugging messages
            [ ]    2C Algorithm debugging messages
            [ ]    2C Bus debugging messages
            [ ]    2C Chip debugging messages
```

▲ **Enable I2C support in your kernel...**

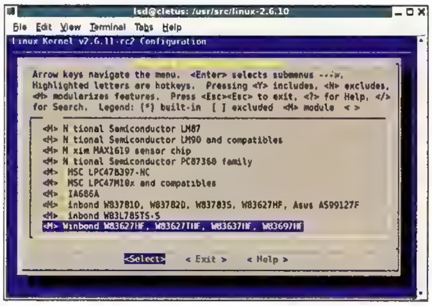
1 Open the kernel configuration and enable 'I2C support' under 'device Drivers'.



lsd@cletus: /usr/src/linux-2.6.10
Bile Edit View Terminal Tabs Help
<Select>
< Exit >
< Help >

```
Linux Kernel v2.6.11-rc2 Configuration

  Arrow keys navigate the menu.  <Enter> selects submenus --->.
  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>
  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >

           < >  3 Savage 4
           < > N tSemi SCx200 ACCESS.bus
           < >  iS 5595
           < >  iS 630/730
           < >  iS 96x
           < >  2C/SMBus Test Stub
           < > VIA 82C586B
           <M>  IA 82C596/82C686/823x
           < >  oodoo 3
           < >  CA9564 on an ISA bus
```

▲ **...and the I2C driver for your motherboard.**



lsd@cletus: /usr/src/linux-2.6.10
Bile Edit View Terminal Tabs Help
<Select>
< Exit >
< Help >

```
Linux Kernel v2.6.11-rc2 Configuration

  Arrow keys navigate the menu.  <Enter> selects submenus --->.
  Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
  <M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>
  for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >

   <M> N tional Semiconductor LM87
   <M> N tional Semiconductor LM90 and compatibles
   <M> M xim MAX1619 sensor chip
   <M> N tional Semiconductor PC87360 family
   <M>  MSC LPC47B397-NC
   <M>  MSC LPC47M10x and compatibles
   <M>  IA686A
   <M>  inbond W83781D, W83782D, W83783S, W83627HF, Asus AS99127F
   <M>  inbond W83L785TS-S
   <M> Winbond W83627HF, W83627THF, W83637HF, W83697HF
```

▲ **...and finally, the driver for your sensor chip.**

2 Inside the I2C section, enable modules for the following options:

- I2C device interface.

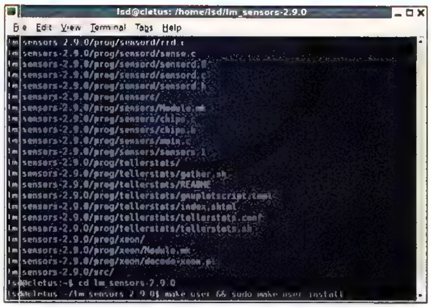
- Under I2C Hardware Bus support, enable at least ISA Bus support, and the driver module for your motherboard chipset. If you're not sure which driver to use, enable them all.

- Under Hardware Sensors Chip support, enable everything, unless you already know exactly what chip your board uses.

And then compile and install the kernel. For older systems, now's as good a time as any to upgrade. If you really want to keep your old kernel though, you can grab the source code to the i2c and lm_sensors drivers from the lm_sensors website. Follow the instructions in the QUICKSTART file inside the lm_sensors tarball to get things up and running quickly.

Warning – there be dragons here!

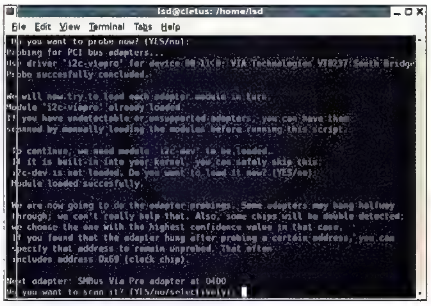
lm_sensors is low-level voodoo, and has in some rare cases been known to cause damage to hardware. It shouldn't really be a problem these days, but if you like to worry, it's probably not a bad idea to check Google for success reports for your motherboard before you get started.


lsd@cletus: /home/lsd/lm_sensors-2.9.0
File Edit View Terminal Tabs Help

```
lm_sensors-2.9.0/prog/sensord/rrd.c
lm_sensors-2.9.0/prog/sensord/sense.c
lm_sensors-2.9.0/prog/sensord/sensord.8
lm_sensors-2.9.0/prog/sensord/sensord.c
lm_sensors-2.9.0/prog/sensord/sensord.h
lm_sensors-2.9.0/prog/sensors/
lm_sensors-2.9.0/prog/sensors/Module.mk
lm_sensors-2.9.0/prog/sensors/chips.c
lm_sensors-2.9.0/prog/sensors/chips.h
lm_sensors-2.9.0/prog/sensors/main.c
lm_sensors-2.9.0/prog/sensors/sensors.1
lm_sensors-2.9.0/prog/tellerstats/
lm_sensors-2.9.0/prog/tellerstats/gather.sh
lm_sensors-2.9.0/prog/tellerstats/README
lm_sensors-2.9.0/prog/tellerstats/gnuplotscript.tmpl
lm_sensors-2.9.0/prog/tellerstats/index.shtml
lm_sensors-2.9.0/prog/tellerstats/tellerstats.conf
lm_sensors-2.9.0/prog/tellerstats/tellerstats.sh
lm_sensors-2.9.0/prog/xeon/
lm_sensors-2.9.0/prog/xeon/Module.mk
lm_sensors-2.9.0/prog/xeon/decode-xeon.pl
lm_sensors-2.9.0/src/
lsd@cletus:~$ cd lm_sensors-2.9.0
lsd@cletus:~/lm_sensors-2.9.0$ make user && sudo make user_install
```

▲ Installing the lm_sensors user-space tools.

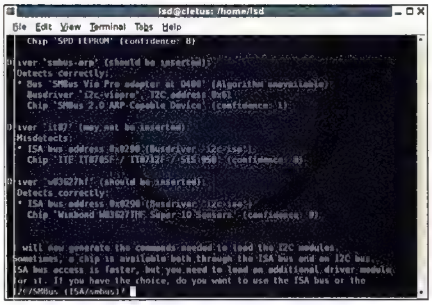
For the user-space tools, most distributions should have packages – on a Debian system for example, simply ran an 'apt-get install lm-sensors'. If all else fails, grab the lm_sensors source. Once it's extracted, you can build just the user-space tools with 'make user', and then install them with 'make user_install' as root.



```
Do you want to probe now? (YES/no):
Probing for PCI bus adapters...
Use driver `i2c-viapro' for device 00:11.0: VIA Technologies VT8237 South Bridge
Probe succesfully concluded.

We will now try to load each adapter module in turn.
Module `i2c-viapro' already loaded.
If you have undetectable or unsupported adapters, you can have them
scanned by manually loading the modules before running this script.

To continue, we need module `i2c-dev' to be loaded.
If it is built-in into your kernel, you can safely skip this.
i2c-dev is not loaded. Do you want to load it now? (YES/no):
Module loaded succesfully.

We are now going to do the adapter probings. Some adapters may hang halfway
through; we can't really help that. Also, some chips will be double detected;
we choose the one with the highest confidence value in that case.
If you found that the adapter hung after probing a certain address, you can
specify that address to remain unprobed. That often
includes address 0x69 (clock chip).

Next adapter: SMBus Via Pro adapter at 0400
Do you want to scan it? (YES/no/selectively):
```

▲ The sensors-detect script scans your system.

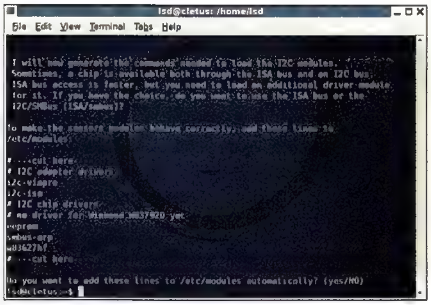
With everything installed, you can auto-detect your sensor hardware by running the 'sensors-detect' command as root. After finding your I2C controller it begins scanning for sensors, asking for comfirmation at each step. Read through the prompts if you like, but you can keep hitting Enter blindly until you get to the end of the detection process, where each bit of hardware found is listed.



```
    Chip `SPD EEPROM' (confidence: 8)

Driver `smbus-arp' (should be inserted):
  Detects correctly:
  * Bus `SMBus Via Pro adapter at 0400' (Algorithm unavailable)
    Busdriver `i2c-viapro', I2C address 0x61
    Chip `SMBus 2.0 ARP-Capable Device' (confidence: 1)

Driver `it87' (may not be inserted):
  Misdetects:
  * ISA bus address 0x0290 (Busdriver `i2c-isa')
    Chip `ITE IT8705F / IT8712F / SiS 950' (confidence: 8)

Driver `w83627hf' (should be inserted):
  Detects correctly:
  * ISA bus address 0x0290 (Busdriver `i2c-isa')
    Chip `Winbond W83627THF Super IO Sensors' (confidence: 8)


I will now generate the commands needed to load the I2C modules.
Sometimes, a chip is available both through the ISA bus and an I2C bus.
ISA bus access is faster, but you need to load an additional driver module
for it. If you have the choice, do you want to use the ISA bus or the
I2C/SMBus (ISA/smbus)?
```

▲ The list of I2C and sensor devices found.

Choose whether to use ISA or SMBus for sensor access (either is usually fine), and the script will print out a list of appropriate modprobe commands to add to your system startup. It should look something like this:



```
I will now generate the commands needed to load the I2C modules.
Sometimes, a chip is available both through the ISA bus and an I2C bus.
ISA bus access is faster, but you need to load an additional driver module
for it. If you have the choice, do you want to use the ISA bus or the
I2C/SMBus (ISA/smbus)?

To make the sensors modules behave correctly, add these lines to
/etc/modules:

#----cut here----
# I2C adapter drivers
i2c-viapro
i2c-isa
# I2C chip drivers
# no driver for Winbond W83792D yet
eeprom
smbus-arp
w83627hf
#----cut here----

Do you want to add these lines to /etc/modules automatically? (yes/NO)
lsd@cletus:~$
```

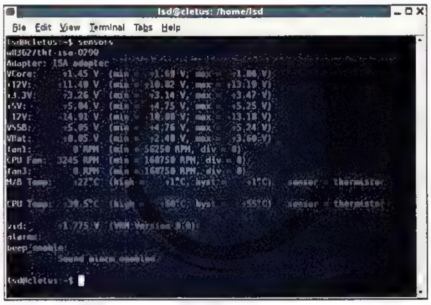
▲ Driver module recommendations for the system.

```
# I2C adapter drivers
modprobe i2c-viapro
modprobe i2c-isa
# I2C chip drivers
# no driver for Winbond W83792D yet
modprobe eeprom
modprobe smbus-arp
modprobe w83627hf
```

Out of these, 'i2c-viapro' and 'i2c-isa' provide the I2C access, and 'w83627hf' is the driver for the Winbond sensor chip on our ASUS A8V Deluxe motherboard. The other drivers add extra information about your RAM and SMBus. If any of that excites you, feel free to have a play, but you can usually skip them.

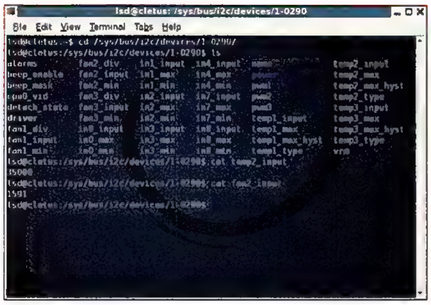
Copy and paste the desired driver lines to an appropriate startup script if you like, but for now, you can just try running the commands manually. Once the modules have been loaded, you should be able to view the sensor output with the 'sensors' command. You'll also find the sensors in the /sys filesystem:

```
cd /sys/bus/i2c/devices/
ls -l
```



```
lsd@cletus:~$ sensors
w83627thf-isa-0290
Adapter: ISA adapter
VCore:     +1.45 V  (min =  +1.60 V, max =  +1.86 V)
+12V:     +11.49 V  (min = +10.82 V, max = +13.19 V)
+3.3V:     +3.26 V  (min =  +3.14 V, max =  +3.47 V)
+5V:       +5.04 V  (min =  +4.75 V, max =  +5.25 V)
-12V:     -14.91 V  (min = -10.80 V, max = -13.18 V)
V5SB:      +5.05 V  (min =  +4.76 V, max =  +5.24 V)
VBat:      +0.05 V  (min =  +2.40 V, max =  +3.60 V)
fan1:        0 RPM  (min = 56250 RPM, div = 8)
CPU Fan:  3245 RPM  (min = 168750 RPM, div = 8)
fan3:        0 RPM  (min = 168750 RPM, div = 8)
M/B Temp:    +27°C  (high =    +1°C, hyst =   +1°C)   sensor = thermistor

CPU Temp:  +39.5°C  (high =   +60°C, hyst =  +55°C)   sensor = thermistor

vid:      +1.775 V  (VRM Version 9.0)
alarms:
beep_enable:
          Sound alarm enabled

lsd@cletus:~$
```

▲ The output from the 'sensors' command – you'll be seeing this a lot.


lsd@cletus: /sys/bus/i2c/devices/1-0290
File Edit View Terminal Tabs Help

```
lsd@cletus:~$ cd /sys/bus/i2c/devices/1-0290/
lsd@cletus:/sys/bus/i2c/devices/1-0290$ ls
alarms        fan2_div    in1_input  in4_input  name            temp2_input
beep_enable   fan2_input  in1_max    in4_max    power           temp2_max
beep_mask     fan2_min    in1_min    in4_min    pwm1            temp2_max_hyst
cpu0_vid      fan3_div    in2_input  in7_input  pwm2            temp2_type
detach_state  fan3_input  in2_max    in7_max    pwm3            temp3_input
driver        fan3_min    in2_min    in7_min    temp1_input     temp3_max
fan1_div      in0_input   in3_input  in8_input  temp1_max       temp3_max_hyst
fan1_input    in0_max     in3_max    in8_max    temp1_max_hyst  temp3_type
fan1_min      in0_min     in3_min    in8_min    temp1_type      vrm
lsd@cletus:/sys/bus/i2c/devices/1-0290$ cat temp2_input
35000
lsd@cletus:/sys/bus/i2c/devices/1-0290$ cat fan2_input
1591
lsd@cletus:/sys/bus/i2c/devices/1-0290$
```

▲ Low-level access to the sensor hardware through the /sys filesystem.

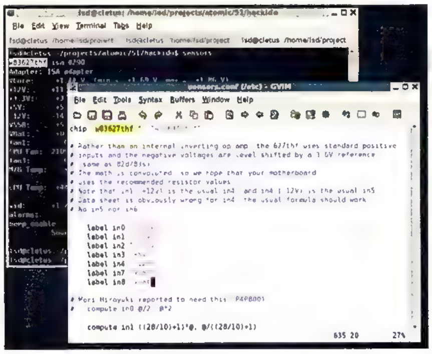
Each directory in here corresponds to a single sensor chip, with files inside such as 'temp1_input' corresponding to each individual sensor. You will also probably find information about the type and volume of RAM you have installed, depending on your system.

Tweaking the sensors

At first, don't be surprised if your sensors reports some odd values. Motherboard sensors aren't an exact science, and quite often you'll find that they're fairly poorly calibrated. The best thing to do is to check the readings in your BIOS, where any necessary adjustment of the raw values is done by the BIOS code.

If the BIOS values are more accurate, and you can work out how they're calculated from the raw values, you can have lm_sensors perform the same tweaking by editing the '/etc/sensors.conf' file. Even if the important values are all right, it's still not a bad idea to edit this file and disable any unused sensor inputs. Follow these steps to edit the file:

1 Run the sensors command and look at the first line of output, which should contain the model number for your sensor chip: 'w83627thf' in this example. Make a note of this value.


lsd@cletus: /home/lsd/projects/atomic/51/hackide
File Edit View Terminal Tabs Help
lsd@cletus /home/lsd/project
lsd@cletus /home/lsd/project
lsd@cletus /home/lsd/project
sensors.conf (/etc) - GVIM
File Edit Tools Syntax Buffers Window Help

```
lsd@cletus:~/projects/atomic/51/hackide$ sensors
w83627thf-isa-0290
Adapter: ISA adapter
```

```
chip "w83627thf-*"

# Rather than an internal inverting op amp, the 627thf uses standard positive
# inputs and the negative voltages are level shifted by a 3.6V reference
# (same as 82d/83s)
# The math is convoluted, so we hope that your motherboard
# uses the recommended resistor values.
# Note that in1 (+12V) is the usual in4, and in4 (-12V) is the usual in5
# Data sheet is obviously wrong for in4, the usual formula should work
# No in5 nor in6

    label in0
    label in1
    label in2
    label in3
    label in4
    label in7
    label in8

# Mori Hiroyuki reported to need this (P4P800)
#   compute in0 @/2, @*2

    compute in1 ((28/10)+1)*@, @/((28/10)+1)
                                                635,20        27%
```

▲ Edit your sensors.conf file to tweak errant values into line.

2 Open the /etc/sensors.conf file in a text editor as root. Search for a line beginning with 'chip' that contains the model number of your sensor chip. For example:

```
chip 'w83627thf-*' 'w83637hf-*'
```

3 Scroll through the configuration lines for your chip. Use the 'ignore' command to remove a sensor from display. If the system and CPU temperatures are around the wrong way, find the 'label' lines for the temp sensors and change the values to match your hardware.

You can also add 'compute' lines to adjust specific values. For instance, if you have a fan that's reading only half as fast as it should, try a compute line like this:

```
compute fan1 2*@,@/2
```

4 After tweaking the configuration, run 'sensors -s' as root to re-read the config file. The 'sensors' command should now show your changes.

If your fan sensors read 0, even though your fans have the necessary monitoring wire leading back to the motherboard fan header, you may need to play with the fan divisor settings. These affect how the sensor chip reads the signal from the fans, with larger divisors generally doing a better job of picking up lower fan speeds. To experiment with these, add lines like this to your sensors.conf:

```
set fan1_div 8
```

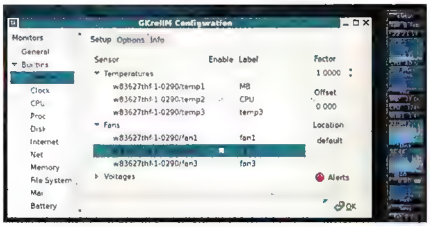
Sensor monitoring

Now that lm_sensors is in place and reading the sensor data, you can install some more interesting sensor monitoring packages.

If you're like us, having something shiny on your desktop is the top priority, and you can't talk about shiny without mentioning gDesklets (gdesklets.org). It's a framework for building simple applications designed to sit in the background, and some of them (like the Mac OS X Dock rip-off, or the XMMS control that takes up one corner of your screen) are pure eye candy.

▲ **gDesklets – it's like shiny 20' rims for your desktop.**

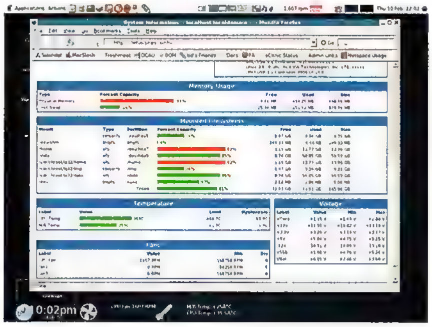
gDesklets can be a bit too bling bling for some though, and the monitors can actually chew up quite a bit of CPU time, which is definitely not what you want when you're trying to get things done, so try and stick with more subdued options. GKrellM (gkrellm.net), long time favourite of blackbox/fluxbox/openbox/whateverbox users, does a very nice job, with your choice between small seperate meters, or the ability to display certain sensor readings alongside the CPU and Proc graphs.



▲ **Slightly more subued sensor output a la GKrellM.**

Personally, the simply-titled Hardware Monitor (www.cs.auc.dk/~olau/hardware-monitor), a GNOME panel applet that can display various values (sensor readings, CPU load, disk usage, etc.) in various ways is a good choice. Plain text display works well for fans, and the BeOS-ish 'bars' display good for temperatures. There's also a neat 'flame' viewer, but that's probably best reserved for Prescott P4 owners.

For keeping an eye on servers, phpSysInfo (phpsysinfo.sf.net) works well, displaying a whole host of stats in either themeable HTML, or XML for parsing and scripting fun. A more proactive option is a monitor daemon like Mondo (mondo-daemon.sf.net). It can perform various actions if it detects dead fans, bogus voltages or excessive heat, from sending out emails to forcibly shutting down the system.



▲ **Check your system's vital states remotely with phpSysInfo.**

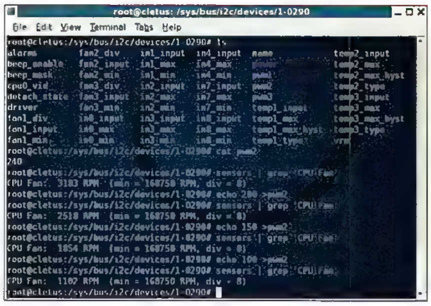
If you're still running an old pre-Palomino Athlon, an automated shutdown in the case of a CPU fan failure is probably a very good idea.

Fan speed control

With some motherboards, lm_sensors can do more than just monitor your fans – it can control them. Most sensor chips have controllers to regulate the voltage being sent to the fan headers on your motherboard, using a technique known as 'pulse width modulation'. Unfortunately, many motherboards just don't connect the sensor chip's PWM outputs to the motherboard's fan headers, but you can check your board in the SpeedFan database at www.almico.com/forummotherboards.php.

The PWM controls are accessible through files alongside your sensor chip inputs under /sys/bus/i2c/devices. These files take a value from 0 to 255 to control the fans, with 0 usually mapped to no power and 255 mapped to maximum. Use the 'echo' command to set a few test values with your case open, and see how they affect the actual fan speed:

```
cd /sys/bus/i2c/devices/1-0290
echo 150 > pwm1
```


root@cletus: /sys/bus/i2c/devices/1-0290
File Edit View Terminal Tabs Help

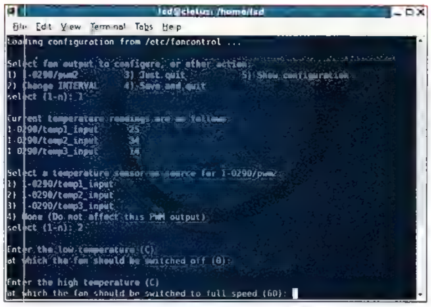
```
root@cletus:/sys/bus/i2c/devices/1-0290# ls
alarms        fan2_div     in1_input  in4_input  name            temp2_input
beep_enable   fan2_input   in1_max    in4_max    [illegible]     temp2_max
beep_mask     fan2_min     in1_min    in4_min    pwm1            temp2_max_hyst
cpu0_vid      fan3_div     in2_input  in7_input  pwm2            temp2_type
detach_state  fan3_input   in2_max    in7_max    pwm3            temp3_input
driver        fan3_min     in2_min    in7_min    temp1_input     temp3_max
fan1_div      in0_input    in3_input  in8_input  temp1_max       temp3_max_hyst
fan1_input    in0_max      in3_max    in8_max    temp1_max_hyst  temp3_type
fan1_min      in0_min      in3_min    in8_min    temp1_type      vrm
root@cletus:/sys/bus/i2c/devices/1-0290# cat pwm2
240
root@cletus:/sys/bus/i2c/devices/1-0290# sensors | grep 'CPU Fan'
CPU Fan:  3183 RPM  (min = 168750 RPM, div = 8)
root@cletus:/sys/bus/i2c/devices/1-0290# echo 200 >pwm2
root@cletus:/sys/bus/i2c/devices/1-0290# sensors | grep 'CPU Fan'
CPU Fan:  2518 RPM  (min = 168750 RPM, div = 8)
root@cletus:/sys/bus/i2c/devices/1-0290# echo 150 >pwm2
root@cletus:/sys/bus/i2c/devices/1-0290# sensors | grep 'CPU Fan'
CPU Fan:  1854 RPM  (min = 168750 RPM, div = 8)
root@cletus:/sys/bus/i2c/devices/1-0290# echo 100 >pwm2
root@cletus:/sys/bus/i2c/devices/1-0290# sensors | grep 'CPU Fan'
CPU Fan:  1102 RPM  (min = 168750 RPM, div = 8)
root@cletus:/sys/bus/i2c/devices/1-0290#
```

▲ **Tweak your fan speeds manually via the /sys filesystemdesktop.**

You could use commands like these to manually adjust the fans as required, but that's no fun – let's get the CPU to do it automatically based on system temperatures.

The fancontrol script

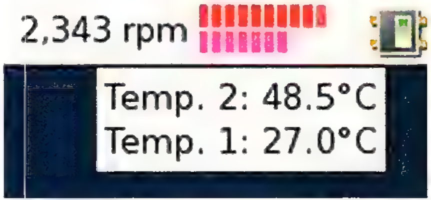
In the lm_sensors package you'll find the 'fancontrol' script, which performs temperature driven fan control based on a configuration file, and a second script called 'pwmconfig' that guides you through writing an appropriate configuration. It begins by setting each PWM controller in turn to 0, checking the reported fan speeds to see if the change has any effect, though it's a good idea to make visual observations of the fans to verify the changes.



```
lsd@cletus: /home/lsd
File  Edit  View  Terminal  Tabs  Help
Loading configuration from /etc/fancontrol ...

Select fan output to configure, or other action:
1) 1-0290/pwm2          3) Just quit           5) Show configuration
2) Change INTERVAL      4) Save and quit
select (1-n): 1

Current temperature readings are as follows:
1-0290/temp1_input      25
1-0290/temp2_input      34
1-0290/temp3_input      14

Select a temperature sensor as source for 1-0290/pwm2:
1) 1-0290/temp1_input
2) 1-0290/temp2_input
3) 1-0290/temp3_input
4) None (Do not affect this PWM output)
select (1-n): 2

Enter the low temperature (C)
at which the fan should be switched off (0):

Enter the high temperature (C)
at which the fan should be switched to full speed (60): 
```

▲ **Set the temperature ranges used to calculate appropriate fan speeds.**

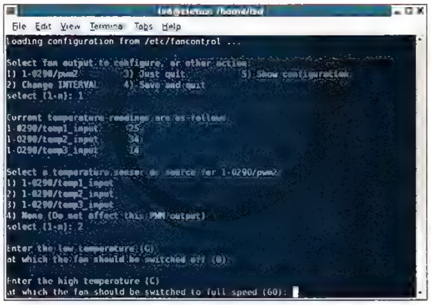
After checking each fan, pwmconfig presents you with a configuration menu. Select each PWM output in turn, starting with option one in the menu, and select the temperature input that'd you'd like to use to control the fan – you'll probably want to use the CPU temperature to control the CPU fan, and the system temperature to control any case fans. Enter the low and high temperatures for the control curve, and the minimum PWM values for when the fan starts and stops spinning (use the test feature if you're not sure, or just take a guess and adjust it later).



▲ **The fan ramps up smoothly under load.**

Once you've configured each fan, use the 'Save and quit' option to save the configuration file. You should now be able to run fanconfig as root, giving it the path to your config (or leaving it to read the default /etc/fancontrol):

```
fancontrol /path/to/fanconfig
```



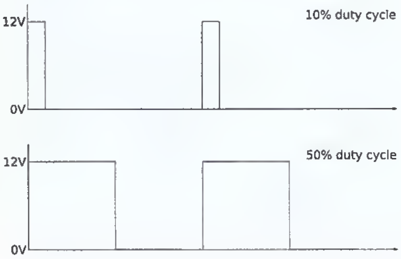
```
lsd@cletus: /home/lsd
File  Edit  View  Terminal  Tabs  Help
Loading configuration from /etc/fancontrol ...

Select fan output to configure, or other action:
1) 1-0290/pwm2          3) Just quit           5) Show configuration
2) Change INTERVAL      4) Save and quit
select (1-n): 1

Current temperature readings are as follows:
1-0290/temp1_input      25
1-0290/temp2_input      34
1-0290/temp3_input      14

Select a temperature sensor as source for 1-0290/pwm2:
1) 1-0290/temp1_input
2) 1-0290/temp2_input
3) 1-0290/temp3_input
4) None (Do not affect this PWM output)
select (1-n): 2

Enter the low temperature (C)
at which the fan should be switched off (0):

Enter the high temperature (C)
at which the fan should be switched to full speed (60): 
```

▲ **pwmconfig tests your PWM outputs and fan speed monitoring.**

On our test system, the CPU fan plummets from about 3300rpm to about 1500rpm when idle after firing up fancontrol. Running 'burnK7' from the cpuburn package to fire up the CPU causes the fan to spin up as expected, but it's only on hot days that it ever goes over about 3000rpm. Fancontrol has virtually silenced the CPU fan against the background noise from the rest of the system. Enjoy the silence!

Pulse Width Modulation

The first thing that may spring to your mind when you hear the term 'pulse width modulation' is the fun of twiddling knobs on an old analogue synth (or POKEing the SID chip on a Commodore 64), but it's a technique that's useful for more than just funky sounds. Motherboards use PWM to approximate a variable voltage from fan headers that can only really be turned on and off.



PWM works by switching quickly between the on and off states in a loop, pumping out 12V for some of the time and 0V for the rest. The apparent voltage is determined by the *duty cycle*, which describes how much time is spent sending out the maximum voltage. A duty cycle of 10 percent has the motherboard pumping out 12V of power for 10 percent of each loop, for an apparent voltage of 1.2V, while a 50 percent duty cycle runs 12V for half of each loop, resulting in a 6V signal.

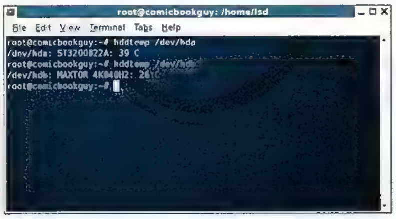
PWM isn't an ideal solution, since it can sometimes cause problems with RPM monitoring, and some fans can make odd noises, particularly clicking sounds, when running from a PWM signal, but being able to control your fans easily through software can be very handy.

Sensing other hardware

Temperature sensors are becoming more common these days in various PC components, so you might be surprised to find that your hard drive and video card may well be able to tell you just how hot they're running. hddtemp (www.guzu.net/linux/hddtemp.php), which you'll find packaged in most distributions, supports thermal sensors in many different IDE hard drives. Simply run it as root, specifying the drive to check:

```
hddtemp /dev/hda
```

Unfortunately, the current Linux SATA subsystem doesn't support the S.M.A.R.T. interfaces used by hddtemp, so for now this will only work with standard IDE drives, but this will hopefully be corrected soon.

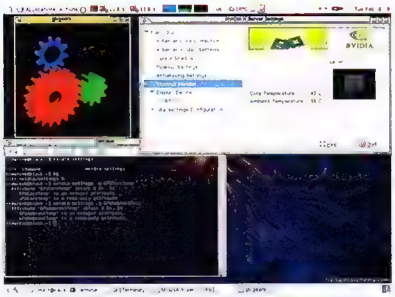


```
root@comicbookguy: /home/lsd
File  Edit  View  Terminal  Tabs  Help
root@comicbookguy:~# hddtemp /dev/hda
/dev/hda: ST3200822A: 39 C
root@comicbookguy:~# hddtemp /dev/hdb
/dev/hdb: MAXTOR 4K040H2: 26 C
root@comicbookguy:~# 
```

▲ **Test the temperature of compatible hard drives with hddtemp.**

Many modern NVIDIA video cards also have thermal sensors, which you can access using the 'nvidia-settings' tool that comes with NVIDIA's Linux drivers. The temperatures should appear in the settings GUI, but you can also have them printed out in to a terminal for you by typing the following:

```
nvidia-settings -q GPUCoreTemp
nvidia-settings -q GPUAmbientTemp
```



▲ **Many new NVIDIA cards have their own sensors.**

The Silent PC Project Part 3

In this final instalment of the project **Ron Prouse** shows you how to make the finishing touches.

Ingredients

Special thanks goes to Altech Computers (**www.altech.com.au**, Ph: (02) 9735 5655) and PC Case Gear (**www.pccasegear.com**, Ph: (03) 9584 7266) for donating the components used to build the ultimate quiet machine. For this month's installment, the ingredients are:

Altech Computers
PC Case
Antec 'Super LANBOY' ATX MiniTower, $165.00
Power Supply Unit
Antec Phantom fanless 350 Watt PSU, $308.00
Fans
GlacialTech "SilentBlade" GT12252BDL-2 Case Fan, $19.00
Heat Sinks
Zalman ZM-2HC2 HDD Heatpipe Cooler, $46.00

PC Case Gear
In addition to the usual equipment, PC Case Gear also supplied the selection of monitor/controller hardware for our in-depth comparison.
Fan Controller
Aerocool Gatewatch LCD. $72.00
Vibration Isolators
Noise Isolator Flex Pad Kit $25.00, Siliceous Washers (10) $4.50, Siliceous Sheet for 120mm Fan $5.50, Siliceous Sheet for ATX PSU $6.50

Thanks to their support you could soon own one of the coolest and quietest cases on the planet!

[illegible]

As the final instalment of a three part tutorial, the basic concepts that will keep your PC case as quiet as possible should now be fairly established – reduce vibration, slow down case airspeed (but not airflow!) and add as much noise-absorbing mass as you can. It all sounds easy in principle, but unfortunately putting it into practice is usually a process of compromise, driven by the environment it will be used in, the hardware that is installed, and the style of case that it is used. The truth is that, for many of us, this last point is often a choice based on fashion rather than function. The thing needs to look sexy!

When it came to choosing a case for this tutorial, 'style' was one of the attributes high on the list, as long as the overall performance wasn't severely impacted by the design. The Super LANBOY is not the 'ideal' enclosure for a Quiet PC, however it was chosen as it has some really positive attributes that make up for a few minor shortcomings.

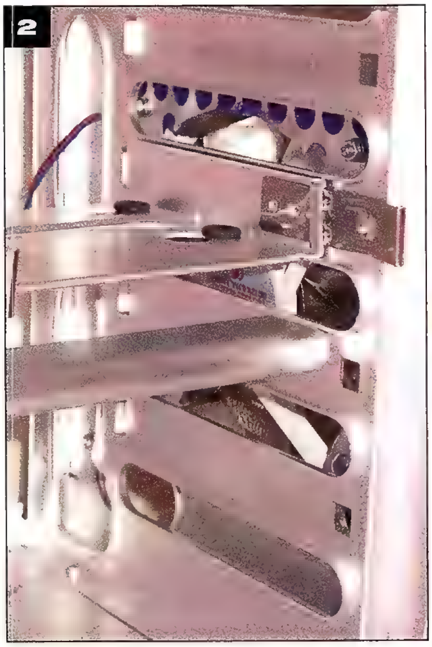
To improve the ventilation, a 120mm top 'blowhole' was fitted, the two standard fans replaced with quieter alternatives, and they were all mounted with noise prevention measures.

The next step is to consider any other mods that need to be performed prior to re-assembling the case – after making sure that you have a good mental picture of the location of each of the components, to allow for clearance when everything goes back together. Where possible, fit components in place, and mark out where everything goes, including ATX and IDE/SATA ports on the motherboard, and the overhang and depth of things such as graphics and expansion cards.

1 One of the features of the Super LANBOY case is the Hard Drive rack that can accommodate up to four HDDs in an unusual 'transverse' configuration. For convenience, the HDDs are screwed into spring-loaded caddies, so that removing a drive is as simple as pushing in the two spring clips and sliding the whole unit out. To try and keep the drives quiet, there are rubber grommets built into the caddy's base to reduce vibration. It all looks great, but in practice it is abysmal!

During spin-up, the caddies rattle in their rack like an empty Bondi tram at high speed. The decision was made to use a different method of mounting the hard drives. If you have 5.25" internal drive bays to spare, then rubber isolation blocks are a cheap alternative that proved to be surprisingly effective – however as the LANBOY only has three external 5.25" bays, this was not a viable option.

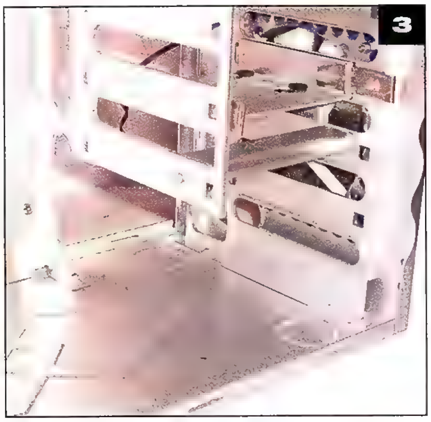
2 Modification of the HDD rack first required the structure to be strengthened, by cross-bracing the two halves. This was done using aluminium step-tread, as the overall profile and surface finish came very close to matching the rest of the interior. The flat section of the step-tread was cut and folded to form flaps down each side of the rack, with a HDD caddy used as a reference length. The sides were drilled and riveted through the frame of the HDD rack, using a 3mm spring washer under the rivets for additional tension.



2

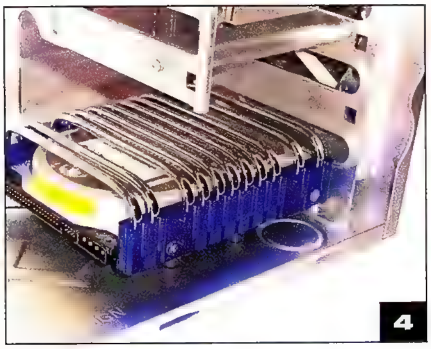
1

3 Once the rack was strengthened, the next step was to remove its lower section and reclaim some floor space at the front of the case. The method in this type of madness is to cut around any structural sections designed to add strength to the case – in other words, retain as many of the folds, bends and flanges as possible, so that the rigidity of the case is less compromised. A Dremel with reinforced cutting wheel was used to slice away the sheet metal that was in the way, and all of the sharp edges removed with a sanding block.



3

4 The choice of hard drive mounting was obvious, a Zalman ZM-2HC2 Heatpipe Cooler is not only designed to keep high-RPM drives cooler, it is also utilises four rubber mounts on the base to minimise vibration related noise. Fitting was simplified by using the enclosed drilling template that marked the position of the mounting holes. The main thing to watch is that all of the holes are on the same flat surface – the LANBOY has some raised sections in the floor that need to be avoided for optimum placement.

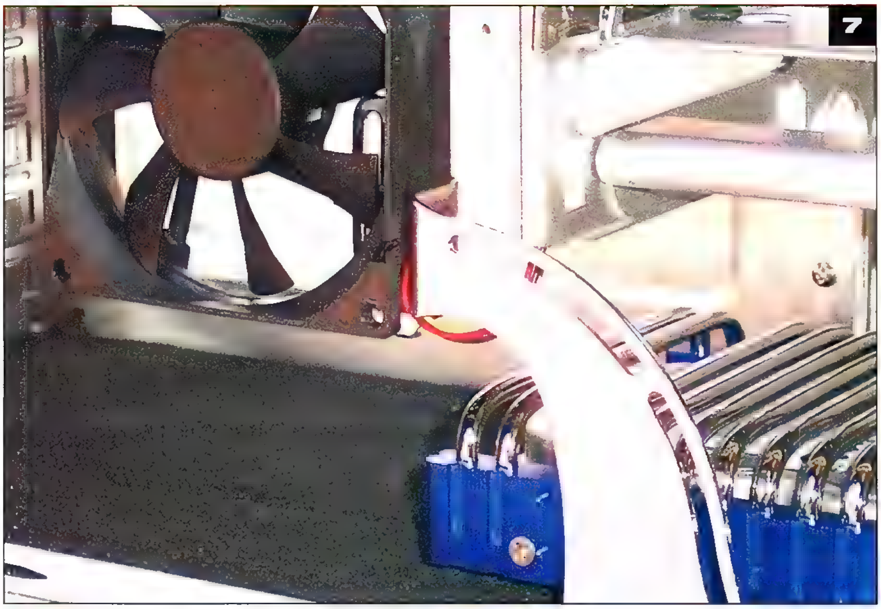


4

5

5 With the holes drilled for the HDD assembly, the next step is to cover the floor with acoustic foam. This will help minimise noise by absorption and it's non-reflective properties also help to stop sound waves from bouncing around. After cutting the foam to shape with a sharp blade, cut slots and holes so that screws, etc, can be accessed more easily. Cutting with a razorblade or scalpel will work fine, but for a really professional finish a hole-punch is *the* tool for the process. These four holes line up with the mounting points of the Zalman HDD cooler, while the slot is an allowance for the OEM HDD rack.

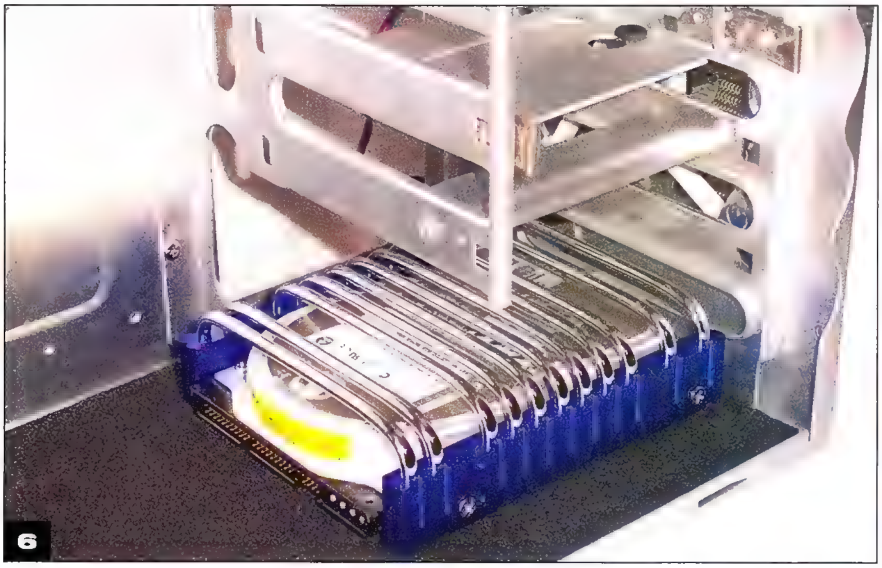
6 Once the acoustic foam is installed, the Zalman HDD caddy can be mounted for the final time, again using siliceous washers under the metal washers and screws where they pass through the case. The Super LANBOY case does not have a great deal of strength in the floor, so if the case is going to be transported regularly it would be prudent to have an additional plate supporting the bottom panel, approximately 2cm out from the Zalman mounting points – acting as a large washer to help spread the HDD weight.



7

7 With the three 120mm fans running on low speed, airflow through the case is sufficient to keep the PC running at a reasonable ambient temperature, but it's always a good idea to have an 'Ace up your sleeve' for those times that require a little more extreme cooling – hard gaming sessions, summer heatwaves, etc. The Zalman FB123 is designed to attach onto the PCI card retention screws, and push air over areas such as graphics cards, northbridge chipsets and hard drives. For this application, the bracket has been modified to allow it to be mounted via the case bottom, with the bracket mounted off to one side so that the motherboard/expansion cards can be easily removed. The 92mm fan is positioned close to the case window, so that it will be able to take advantage of an external port.

8 Once the 92mm fan is mounted in its final location, the side-cover is fitted back into place and the centre position of the fan marked onto the cast acrylic window. The window should either have any protective coat left intact, or masking tape can be used around the location of the cut to avoid damaging the surface. Cutting blowholes into acrylic is made simple using a hole-saw running at low speed and a piece of timber clamped to the case behind the cut. After cutting out with an 82mm saw, the cover is suspended over a 300mm support jig, and a rotary sanding block can be used to enlarge, de-burr and shape the hole. The final step is to finish off sanding with 1000 grit wet'n'dry paper, and then hand-buff the edge to a glass finish using 'Brasso' metal polish and a soft cloth.



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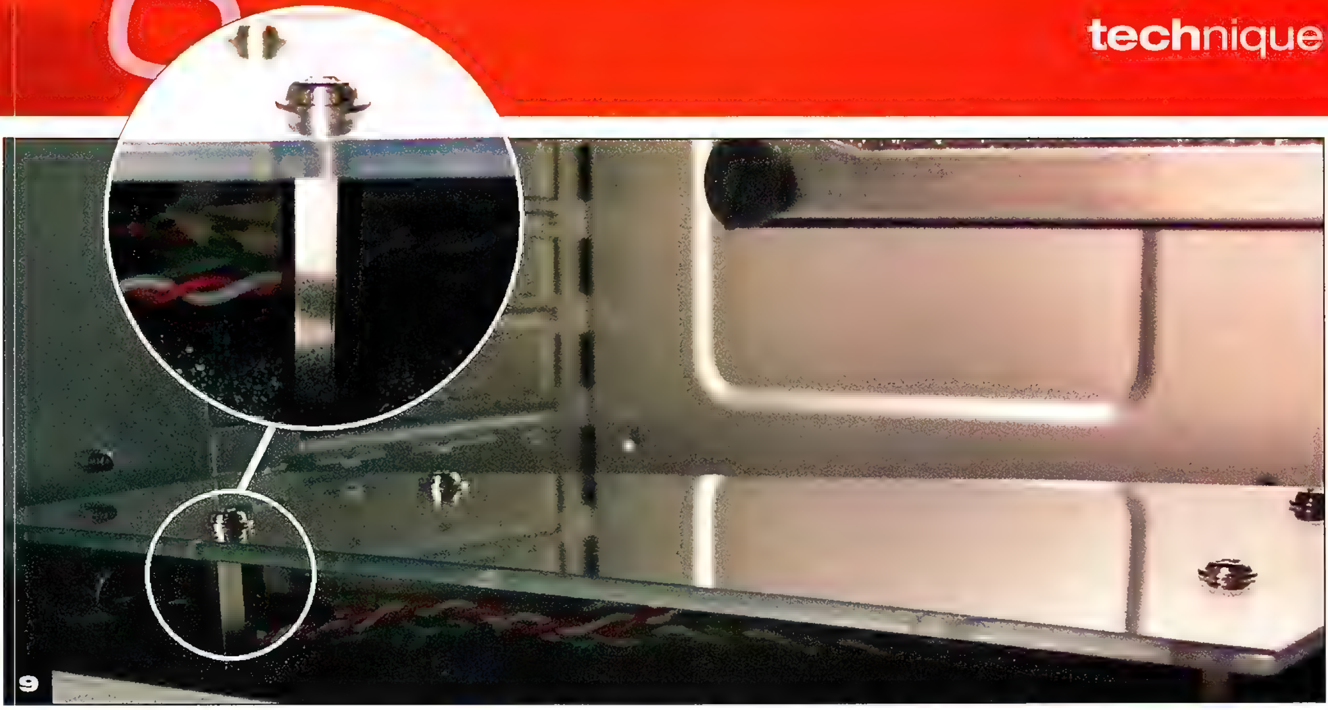


9

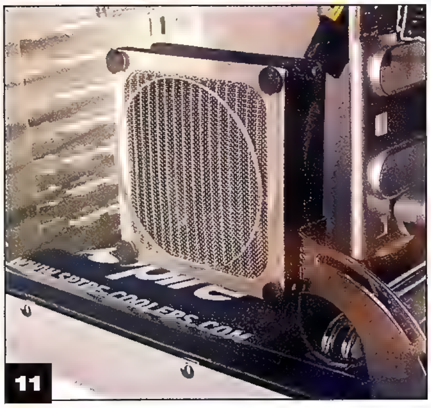
9 Another quick mod that will make a difference to the aesthetics of any case is a ‘false floor’, which can be used to conceal and protect wiring, cables or even lighting. The false floor panel can be made from almost any type of rigid sheet, in this case it is 3mm plastic mirror panelling – adding a mirror effect on the floor looks fantastic, especially when lighting is added, but beware… it will collect dust, par excellence! The first step is to measure the size and shape of the floor panel and cut it to shape – it does not have to cover the whole area. For example, in this instance it covers less than half. Drill 3mm holes where the mounting points will be, and transfer those measurements to the case floor. In this instance, the floor needs to be raised by 25mm, leaving enough room for the cables into the Zalman HDD rack, but still lower than the bottom edge of the window. This was achieved using metal standoffs (we used Jaycar Part # HP 0907) that are threaded to take 3mm screws.

10 Although a mirror floor looks effective it is also highly reflective, and the echo of reverberation is an effect that we are trying to avoid. Conversely, the same surface covered with sound absorption material will become a ‘black hole’ for most sound frequencies. So the answer is simple – cover the false floor with acoustic foam!

If you are installing a false floor that only takes up a percentage of the available floor space, the trick is to make sure that the look of the upper and lower levels ‘match’ – in this case, both are covered with acoustic foam. If they look the same, the illusion through a case window is that there is only one floor level.

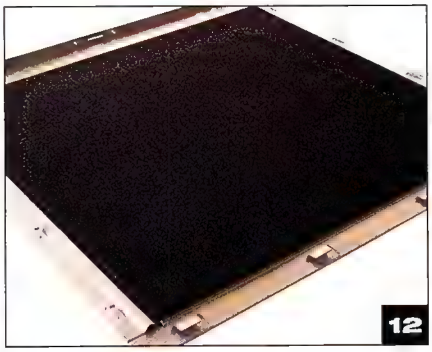
11 The protective coat or masking tape can now be taken off, and any residual adhesive can be removed using a light coat of ‘Brasso’ with a soft cloth. The great thing about this blowhole is that the fan is totally contained within the case, leaving nothing to impede the removal of the side cover, however as the fan is so close to the window there is a slight possibility that it could cause noise through vibration against it – this can be avoided by using SilenX silicone mounts to attach the dust-filter and letting the heads of the mounts act as buffer pads. The intention is that the fan would only be used occasionally, and therefore it is not a major issue that the dust-filter is not completely sealed around the edges of the blowhole.

10



11

12 The last task before bolting everything back together is to line the remainder of the case, where possible, with acoustic foam. Make sure you allow enough room around external panels so that everything fits back together properly, and remember not to block off any OEM ventilation points. As an example, the Antec Phantom 350W fanless power supply requires plenty of airspace for its heatsinks to be effective. Insulating these types of components too heavily is asking for problems later on.



12

13 With the case complete it is time to look at a couple of fan controller options, some alternative hard drive solutions and monitoring hardware. This is not meant to be an in-depth comparison, but merely a few passing thoughts on some of the more common offerings.

The Noise Isolator fan controller is excellent value for money at $35.00, with three separate channels that can control two fans simultaneously. In addition to fan speed control, the unit is built with two power switches that can be used to switch 12V DC devices such as case lights. The only drawback is that the Super LANBOY requires modification for it to fit behind the drive door.

The Fan Master is $59.00, and will independently control the speed of up to four fans. It is also a programmable temperature monitor and alarm with four sensors provided. There are seven different LCD backlight colour options so you can change the look to match your case. The big plus in this instance is that it will fit behind the case door.

Both the CoolerMaster Cooldrive Six ($99.00) and the Vantec Vortex ($65.00) perform as they are supposed to, with the Vortex having a more effective fan for HDD cooling at the expense of another dB(A) or two at full speed.

The Hardcano 13 ($113.00) is extremely fiddly, and is not intuitive to set up. It tries to be too many things at once, but it does the job.

The Macpower Digidoc 5 system monitor was included just for 'Old Skool' sake, but the truth is that it is still a serious contender at the discounted price of $62.00. The Digidoc allows you to simultaneously gauge the temperature, monitor voltage, and monitor up to eight separate fans.

The final piece of hardware, the Aerocool Gatewatch LCD display takes up two 5.25" drive bays, and boasts all of the usual functions plus a few extra – 4 x fan speed display, 4 x alarm temperature display, 4 x temperature readings display, sound active equalizer, 24hr time display, volume indicator, alarm, automated fan control, manual fan control, master volume control, and the ability to change the LCD backlight colour. And it looks sexy! It isn't the best fit in the LANBOY case, as its double-DIN presence protrudes just enough to 'lean' on the door when closed, the fan speed control is not that flexible, there is no option to save settings in the manual mode, and the little animated dog is as annoying as the canine MS Office Assistant, but the 'sexy vote' overlooks these shortfalls.

Conclusion

The brief was to construct a quiet PC box that would be able to cope with the heat output of a cutting edge PC, and include enough room for water-cooling if that was a requirement. The other consideration was that it should be 'stylish', so that it could look at home amongst the other guests at a LAN.

And as you can see below, the the final outcome is a downright stupendous, sexy, *and* largely silent case.

And better yet, it could be yours! Simply answer the question below for your chance to win it. The new owner can still have fun installing a system with case lighting and temperature sensors, but the cutsom-crafted basics are all there and ready to be used at your leisure and pleasure!

WIN! The ultimate quiet case!

Not in the mood to build your own silent case? No problem! Win Ron's fantastic creation for yourself! Simply answer the following question, and this could be yours!

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- 2 x 80mm Green UV Case Fans
- 1 x Zalman ZM-NB47J Northbridge Passive HS
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Banana republic

Twenty years ago it was every kid's dream to become a Jedi. These days, it's Pikachu. **Logan Booker** gets forceful.

Hello everybody. My name is Logan Booker and I don't like LucasArts. The thing is, I have disliked LucasArts for some time now – heck I berate it every chance I get, mainly because it utterly eradicated what was left of adventure gaming. With an icy, emotionless wave of its hand, higher management single-handedly wiped out the genre the company, in an earlier life, had so passionately wrought. Such is the power of the influential games developer.

LucasArts also cut loose the twin geniuses Daron Stinnett and Ray Gresko, both of whom played a big part in bringing the Jedi Knight series to fruition.

The reality is however that the axing of Full Throttle 2 and Sam and Max: Freelance Police was almost a year ago, and I have trouble holding grudges. In essence, I've been waiting for LucasArts to produce something super-special to restore my faith in it. Knights of the Old Republic 2, which I had the good fortune to review this month, has gone some way in converting me to the, er, light side. Ironically, it is because it's the first RPG I've played that let's you be 100 percent evil.

A big problem with a lot of role-playing games these days is the focus on being unrealistically nice. What's role-playing without immorality? It's care-bear, that's what, and it gets boring quick.

Arcanum gave it a go, but the number of dialog options and choices to be good far outweighed those to be bad. The closest I've come, before KotOR 2, was Hordes of the Underdark – which is appropriate considering KotOR 2 and HotU are both from BioWare.

In fact, the more evil you are in KotOR 2 the harder it is to be nice. Your dialog options are cut down to a succinct selection of smartarse replies and gory ultimatums, which can be delivered to friend or foe alike. Eventually, your team mates begin to question your motives, but by this time the damage has already been done. This sort of gameplay is totally refreshing, and I commend Obsidian Entertainment for doing a thorough job and LucasArts for allowing it.

We also would have loved to have reviewed the reportedly excellent Resident Evil 4, but it seems a certain company can't handle criticism over its failing console and stale franchises. In fact, it's attitude in general has been decidedly immature, and I have never witnessed anything quite like it in my two and a half years as a journalist.

Honestly? Grow up.

Was Vanilla Ice *that* bad? Help Logan remember.
logan@atomicmpc.com.au

gameplaycontents

Scanner **80**
It's a newsy month! The demise of Ion Storm Austin; GTA creator has plans for MMO; Matrix Online and Guild Wars close to release and hackers expose DOA's Kazumi, much to the disapproval of Temco's lawyers.

Engine Room: Elder Scrolls 4: Oblivion **82**
Bethesda is again hard at work on another massive RPG, and, just like its predecessors, it's bloody beautiful. We take a trip to Tamriel and check one of the most gorgeous games ever.

Knights of the Old Republic 2: The Sith Lords **88**
Logan Booker gets in touch with the Force, his lightsaber and Admiral Ackbar in Obsidian Entertainment's debut game.

Project: Snowblind **91**
Ron Osborn plays Robocop in this very yuletide first-person shooter.

Second Sight **93**
Ashton Mills trials a light-headed medium in a heavy situation.

Death by Degrees **94**
Logan Booker discovers what happens when you combine survival horror, Tekken and Jet Li.

powergamer

Antialiasing (AA) and anisotropic filtering (AF) can be mysterious beasts at the best of times. So here are a few pointers to help you select the right settings. We recommend the excellent Rivatuner (**www.guru3d.com**) for NVIDIA card owners, and Rage3DTweak (**www.rage3d.com**) for those with ATI gear.

Antialiasing

- 'xS' modes provide better quality than 'n-tap' modes. Note that at higher settings, xS can blur text. We recommend 4xS for the majority of users.
- Forget AA on older hardware. 2x will totally bone an MX, and the performance hit just isn't worth it on a Ti4200 or similar.
- Avoid Quincunx. It will eat your babies.

Anisotropic filtering

- Most GeForce FX and newer cards can handle 4x and 8x modes without breaking a sweat, so at least enable 4x. It makes a noticeable difference.
- Anything over 8x won't really improve image quality. Enable tri-linear filtering if you can.

Disable AF and AA if your frame rates are unplayable. Additionally, a lot of shadowing techniques take a lot of CPU cycles, so disabling them can really help improve performance. Neverwinter Nights is a good example of a game that sees a good boost with shadows off. If you really must have shadows, use the 'Simple' or 'Blob' options.

shortcircuits

Doom 3

Fans of Doom 3 can rejoice as the expansion Resurrection Evil is on the verge of release. In addition, Doom 3 is about to find itself on Xbox, along with Ultimate Doom and Doom 2. These three games are to be packaged together in a special collector's edition for owners of Microsoft's popular console.

According to online sources, David Jones, the creator of Grand Theft Auto, has plans to create a MMO in the style of his original opus, called All Points Bulletin. You'll get to own a car, spruce it up, pop caps and generally do GTA-like things. Jones' company, Real Time Worlds, will develop the title and it will be published by Korean-based Webzen.

Although Half-Life 2 is fast becoming ancient history, Valve continues to update Source, the engine on which the game is based. The latest addition is high dynamic range lighting, or HDR. Probably the best example of the tech can be seen in the Unreal Engine 3 demos, where the realism imparted by the bloom and luminance effects is considerable. It's not known at this time when the changes will be made live.

Temco wants hackers dead or alive

In recent months we've been subjected to a spate of increasingly bizarre lawsuits involving games, hardware or both. Take firm McKool Smith suing every game publisher on Earth, for example. We're still waiting to see how that one turns out.

Temco, not wanting to break the trend, has set its legal dogs loose on Mike Greiling and Will Glynn, the proprietors of **www.ninjahacker.net**, along with a hundred or so of its registered members for reverse engineering its games, including titles like Dead or Alive: Extreme Volleyball and Ninja Gaiden.

Specifically, Temco has taken issue with materials being distributed thanks to this reverse engineering – in particular nude skins for DOA: Extreme Volleyball, which Temco says incorrectly represent the characters in the game. It has made it clear that the nudity is not the main issue – it's the means in which the skins are being created that has it all hot and flustered.

Currently, there is no legal precedent for this sort of thing, so Temco is relying on the DMCA to see it through. It should be noted that only people with modded Xbox consoles can use the skins, so, if anyone should be upset, it's Microsoft, not Temco.

The end of the Storm

Following in the footsteps of its Dallas counterpart, Texas-based Ion Storm Austin has finally closed its door at the tender age of eight. The decision, made by parent company EIDOS, signals the end of John Romero's fanciful dreams of designer heaven.

Romero envisioned a development studio where designers could focus on the art of their craft, rather than the real technicalities of creating a game – such as paying people. Obviously, the business model failed to fly.

With the departure of Warren Spector late last year, and the lukewarm reception to both Dues Ex 2: Invisible War and Thief: Deadly Shadows, the studio wasn't exactly looking its best in the face of other FPS titles including Doom 3, Far Cry and Half-Life 2.

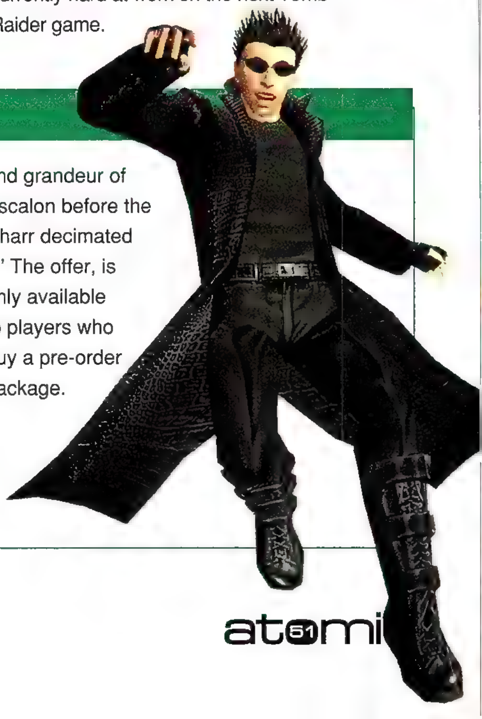
With Ion Storm but a memory, EIDOS will likely focus its attention on its Crystal Dynamics studio, best know for the Legacy of Kain series, which is currently hard at work on the next Tomb Raider game.

ping: more online madness, just for you

We were surprised to hear this month that Sega and Warner Bros. plan on releasing the Matrix Online in the States in late March this year.

Why surprised? Well, according to a mid-February news post on the official website (**www.matrixonline.com**): 'Fans of The Matrix Online can look forward to another Stress Test in addition to the Open Beta, currently scheduled for early March.' We wish Monolith the best of luck cramming an open beta, stress test and the actual game release all into the same month. Slightly more optimistic is the the European release date, which is set for sometime in April.

Right on the toes of Matrix Online is Guild Wars (**www.guildwars.com**), which is geared for a simultaneous US/Europe release on 28 April. As a prelude to this, developer NCSoft has plans to host a special event that will allow players to 'explore the Kingdom of Ascalon before The Searing. The February Beta Weekend Event allows players to experience the beauty and grandeur of Ascalon before the Charr decimated it.' The offer, is only available to players who buy a pre-order package.



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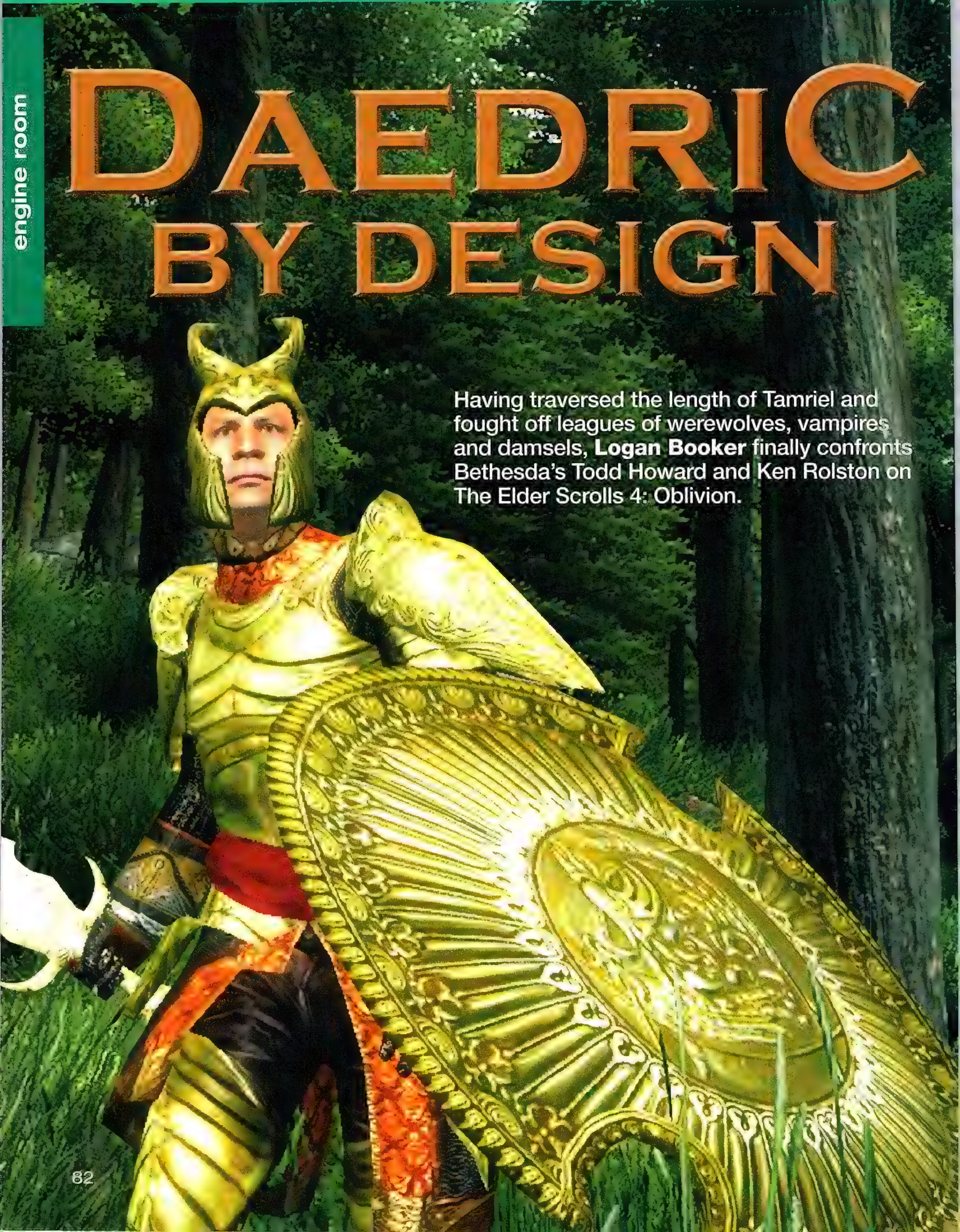


DAEDRIC BY DESIGN

Having traversed the length of Tamriel and fought off leagues of werewolves, vampires and damsels, **Logan Booker** finally confronts Bethesda's Todd Howard and Ken Rolston on The Elder Scrolls 4: Oblivion.

Your basic definition of 'non-linear' varies from game to game. For some, the illusion of freedom is enough. For others, duplicating the real-life mechanic of cause and effect is a labour of love that, like a fiery ball of creativity, consumes the entire design process.

This is especially true if the title in question is a role-playing game – if the player isn't neck-deep in a mushy, warm river of engaging and consequential decisions by the end of the first hour, then it might as well be Pacman. Or Dues Ex.

If there's any developer that has a firm grasp on its fiery balls, it is Bethesda. The company's epic Elder Scrolls series, known everywhere for its insane freeform gameplay and almost unlimited depth, has always set the bar for other RPG titles. Originating with Bethesda's Arena in 1993 and quickly followed three years later by Daggerfall, the world of Tamriel played its masterstroke in 2002 with Morrowind, after almost a decade of maturation.

While titles such as Redguard and Battlespire, also based in the world of Elder Scrolls, didn't enjoy the same levels of success as the aforementioned games, they did help nurture the lush world of Tamriel visually, geographically and even theologically. Now, it is a land thick with history, people and places, from the desert lands of Sentinel nestled deep in the harsh denizens of Hammerfell, to the cold, unwavering winter peaks of Winterhold in northern Skyrim.

“There's nobody like us, and we like being us. We want to always be vast, visually amazing and completely absorbing.”

It is a world that is now perfectly tempered for yet another satisfying complex and open-ended adventure – this time in the form of The Elder Scrolls 4: Oblivion.

Siblings of Septim

Shortly after Morrowind was completed in 2002, Bethesda once again put coding quill to electronic paper to scribe Oblivion.

'The first year was mainly tech work on the new code base,' says executive producer Todd Howard. Howard has been with Bethesda since its early days, working on many of the Elder Scrolls titles as well as the company's defining action FPS Terminator: Future Shock.

'[Now] we're in full production with everyone cranking out content, quests, and new features and effects daily.

According to lead designer Ken Rolston, the game will be set in a new land, the ruling province of Tamriel, called Cyrodiil.

'Cyrodiil is larger than Morrowind and the large towns and cities in particular are hand-crafted,' he says. Rolston mentions that for those familiar with Morrowind, the larger towns are constructed much like the sprawling Balmora. 'Not like Vivec, which was a large city, but not an altogether comfortably designed one.'

'The underground and otherworldly quest levels are also custom-built using rather amazing modular sets. Your eyes are going to bug out. But we will provide an abundance of random dungeons [based] on the Daggerfall model. They too are custom-built from modular sets, but they have lots of lovable re-spawning monsters and treasure for your golden-hole-looting pleasure,' Rolston explains.

While Bethesda is working hard to best itself in all areas with Oblivion, the feel of the Elder Scrolls series will carry over undisturbed. Regardless of where this feel originates – the epic scope, the distinct environments and characters, or the impenetrably deep lore – Rolston is adamant about keeping players firmly enveloped in the arms of Tamriel.

'There's nobody like us, and we like being us. We want to always be vast, visually amazing, and completely absorbing,' he says.

Oblivion will also benefit from Bethesda's new emphasis on improving the presentation and polish of its games.

'Partly this comes from bigger budgets, more monkeys at keyboards, and more time for the monkeys to type. Partly this comes from an evolving understanding of how people play our games, and how to make them easier and faster to play without losing the vast, amazing, and absorbing stuff,' explains Rolston.

Level up

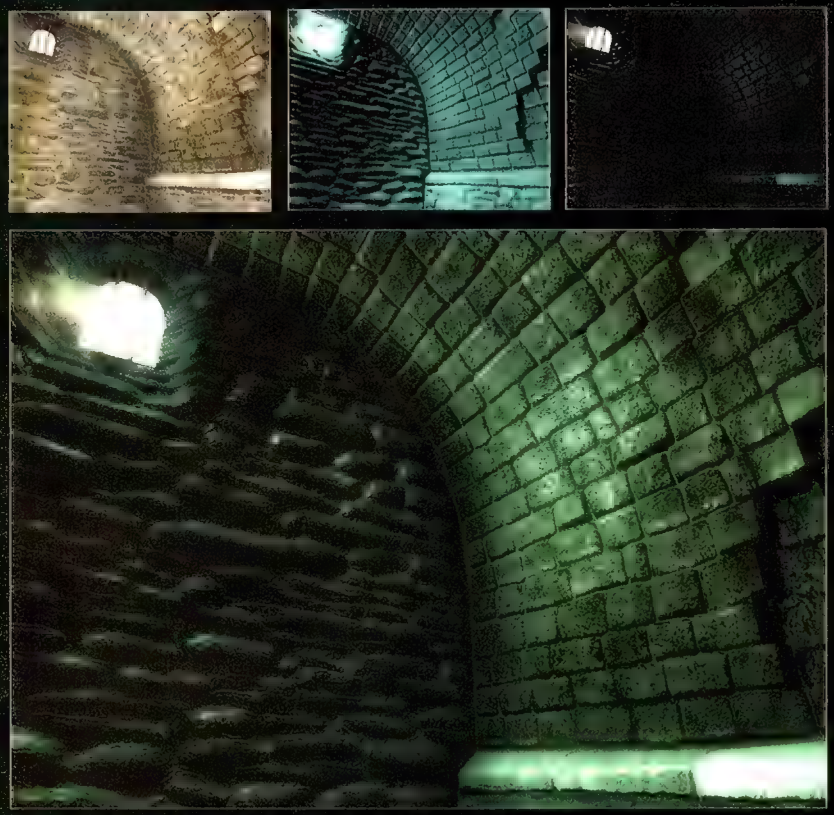
If any part of the Elder Scrolls series has seen attention, it's the core gameplay mechanics. Having gathered insight from players, as well as from their own experiences, Howard and Rolston have big plans for reworking combat, character design and player/NPC interaction.

'The game will be simpler to play, and more complex in terms of character depth.'

"Simpler to play" comes from refinements in interface and from streamlined design concepts, which better emphasise quest objectives and narrative content,' says Rolston.

'Complex character depth comes from subtle AI designs and schedule packages, which externalise character through observable behaviour, and through persuasion gameplay.

Cathedrals in Elder Scrolls are famous for being infested with skeletons. Angry, lonely skeletons.



The walls of the cell above in final render are actually comprised of three separate textures, called maps. Starting from the top left is the diffuse map, which can be considered the base texture. Next is the normal map, or bump map. This is what creates the relief detail and gives the appearance of coarse brickwork. Finally, there is the specular map, which is used to give parts of the wall highlights from light sources such as the sun coming in through the window.

which gives the Speechcraft-specialised player character new tools to explore NPCs.

Basically, the most dynamic gameplay elements will always become apparent when two characters with different base skills attempt the same quest or task. Rolston explains that, while a fighter character may ignore conversation completely, a magic user or rogue well revel in talking with NPCs, interacting with their personalities and convincing them through wordplay. It's always nice to be exposed to entirely different or even completely alien aspects of gameplay depending on your abilities and motivations.

This sort of depth comes at a cost. Many players of the Elder Scrolls series have perceived imbalances with certain classes and skill sets – the main offender in this case being Daggerfall. Rolston however points out that not everything is as it seems.

'The basic Elder Scrolls character and skill systems are not inherently imbalanced. They are, in fact, fairly simple in design, and relatively easy to implement, balance, and extend. The implementation of those systems, on the other hand, is very difficult, because Elder Scrolls games permit the widest possible range of character concepts and gameplay styles in a very large world – large both in space and in time.'

Bethesda, with Oblivion, is committed to getting it right. To this end, not only does the game have more designers, the designers also have more time to perfect the core mechanics to keep them in line with the scope of the game.

'The only way to get better game balance is to do more upfront design planning and to spend lots more time play-testing and revising the game,' says Rolston. 'And, because we have learned "The Bitter Lessons of Building Impossibly Large Games", our production and QA schedule has built in lots more time to play and fine-tune the gameplay, advancement ladders, and economy balances.'

Howard mentions that fighting has also been tweaked. 'This time we've realised how much combat people really do in a game like this and made it more of a priority for us to get right.'

In fact, design has been so committed that it's gone through three types of combat systems. It was only after exploring each system that the final one was settled on.

'We really are striving to get the kinetic energy of guys bashing each other with swords down, and do it right, because no-one has yet. So it plays better, and it looks better. You're in control of it more. There are special moves you can perform and the blocking is active. So the timing of it becomes a key strategy in fighting,' explains Howard.

'It's also bloody. Not from a standpoint of we want lots of gore, but I think when you really smack someone with a sword you expect a certain level of blood to come spewing out. It's not about a heavier emphasis on the keyboard or mouse, but in what and how the player is fighting, and how it will feel to them.'

Pretty water

Elder Scrolls games actually hold the gold medal in two events. The first – pushing the boundaries of game depth and scope – we've already covered. The second, which involves bringing ninja PCs to their knees, we're about to look at.

Rolston is quick to shoot down claims that Bethesda 'creates games that push the absolute limits of graphics and systems hardware.' However, when Daggerfall was released, it ran like a dog – albeit a thoroughbred Labrador with a silky golden coat and pedigree better than most humans. Morrowind barely hit the 40 frames per second mark on an Athlon XP 2000+ with a GeForce4 Ti4600 – a high-spec system for its time.

The simple fact of the matter is that Bethesda strives to take advantage of every available resource – be that a designer, an arithmetic unit or a pixel shader.

'We want stuff to look gorgeous, and it must be compatible with the terrifyingly complex systems of a CRPG, and with the soul-crushingly vast landscapes and the multitudes of actors that populate them. That's not easy,' says Rolston.

'Having said that, we plan on having Oblivion run on as many systems as possible, but it's too early to say how far we can drop the spec right now. Anyway, that's something we felt we could do better this time – having it run on a wider variety of systems than Morrowind did, and I hope we can do it.'

As for engine specifics, Howard let slip that Oblivion makes use of Gamebyro – a modern relative of the NetImmerse technology in Morrowind – as well as the popular Havok middleware for physics.

As with many other recent games, Oblivion will make extensive use of normal mapping and specular maps, as well as shaders for different types of materials such as hair, metal and skin. The team has also forgone the use of displacement mapping and instead gone with parallax mapping – the same as that in Epic's Unreal Engine 3. Parallax mapping, also known as virtual displacement or offset mapping, produces no actual geometry – it fudges pixel placement to give the appearance of bump mapping – and hence there are no shadows or silhouettes. So, while the end result isn't as pretty, it looks very much like displacement mapping while being less intensive on graphics hardware.

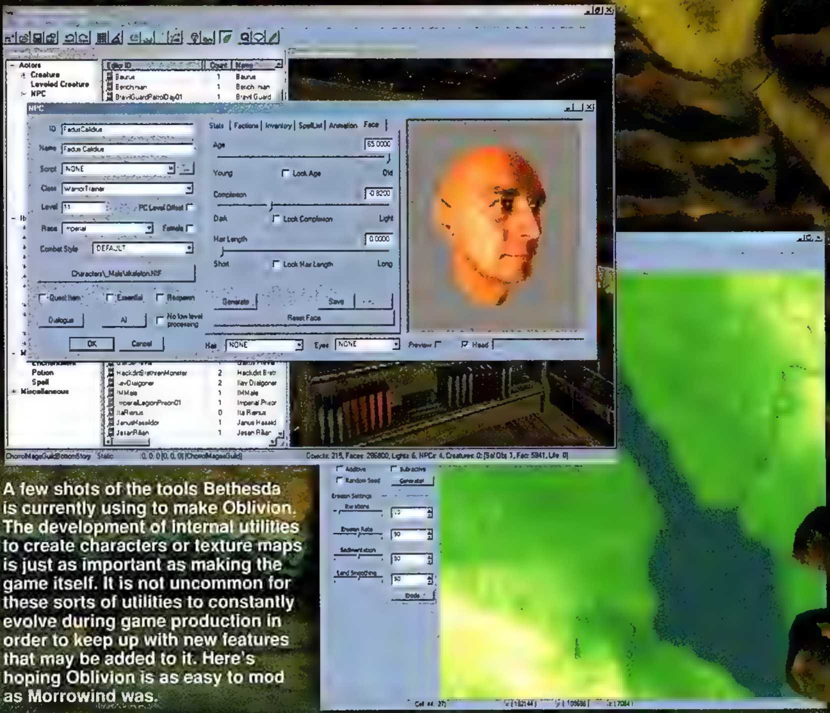
'The use of pixel shaders has definitely had a big impact, and we're only just scratching the surface of what they can do.'

Cliffracers suck

All this is enough to whet the appetite of any CRPG fan, let alone the Elder Scrolls afficionado. Unfortunately, for the time being at least, Oblivion is without a release date. With two years already under its belt, and quest and character production in full swing, we envisage at least another year of work before it hits the streets.

Until then we'll just have to keep dodging assassins, werewolves and, god-forbid, cliffracers in Morrowind.

The world of Tamriel will be populated not only by people, but bucketloads of items as well.



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Name: Fadus Caldius

Script: NONE

Class: WarriorTrainer

Level: 11

Race: Imperial

Combat Style: DEFAULT

Characters_Male\skeleton.NIF

Age: 65.0000

Complexion: 0.8200

Hair Length: 0.0000

Hair: NONE

Eyes: NONE

Editor ID	Count	Name
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Benchman	1	Bench man
BravilGuardPatrolDay01	1	Bravil Guard
HackdirtBrethrenMonster	2	Hackdirt Breth
IlavDiaigoner	2	Ilav Diaigoner
IMMale	1	IMMale
ImperialLegionPrison01	1	Imperial Prisor
ItaRienus	0	Ita Rienus
JanusHassildor	1	Janus Hassild
JesanRilan	1	Jesan Rilan

ChoroMageGuildBottomStory Static :0, 0, 0 [0, 0, 0] [ChoroMagesGuild] Objects: 215, Faces: 286800, Lights: 6, NPCs: 4, Creatures: 0, [Sel Obj: 1, Fac: 5841, Lite: 0]

A few shots of the tools Bethesda is currently using to make Oblivion. The development of internal utilities to create characters or texture maps is just as important as making the game itself. It is not uncommon for these sorts of utilities to constantly evolve during game production in order to keep up with new features that may be added to it. Here's hoping Oblivion is as easy to mod as Morrowind was.

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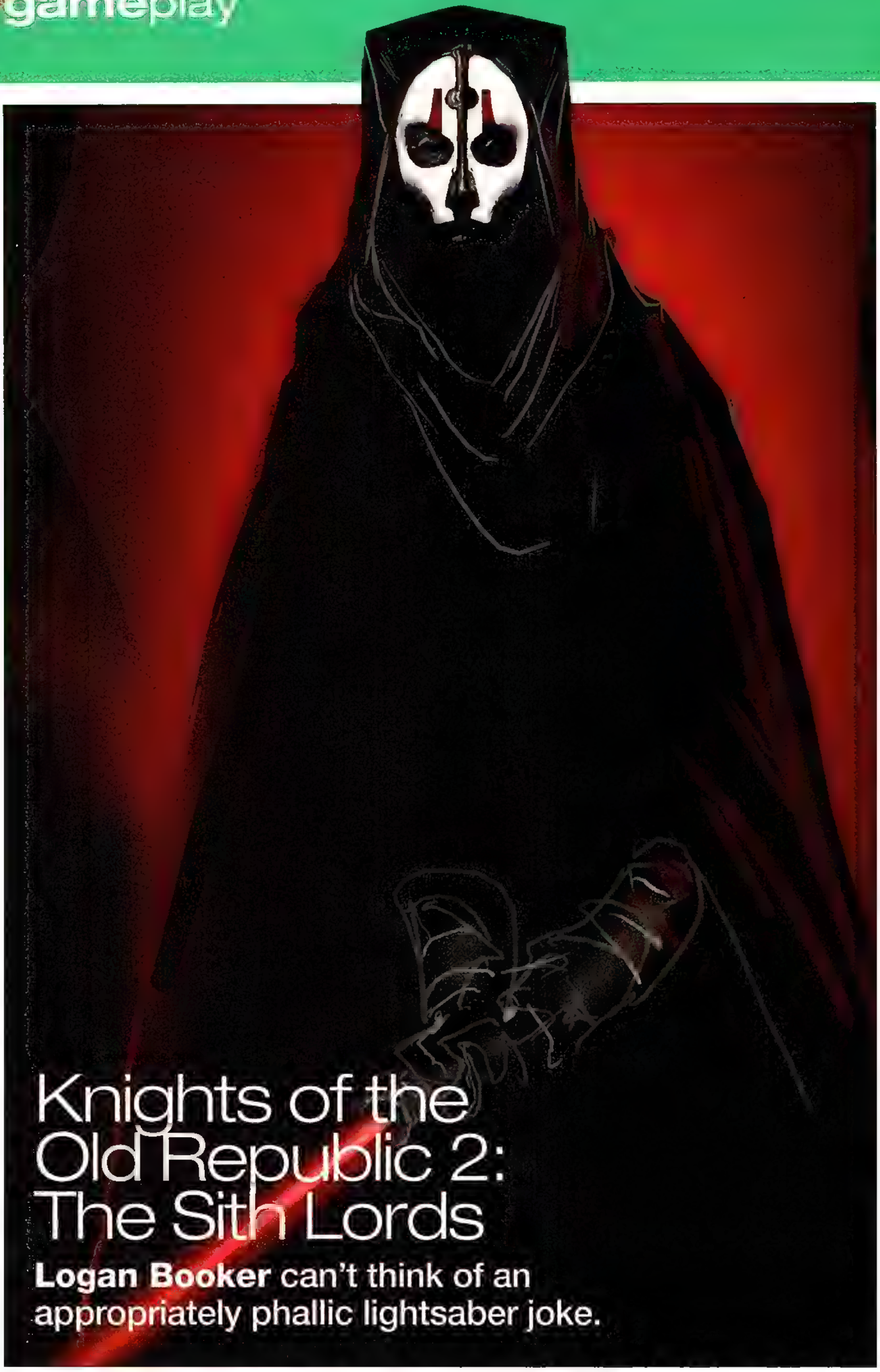
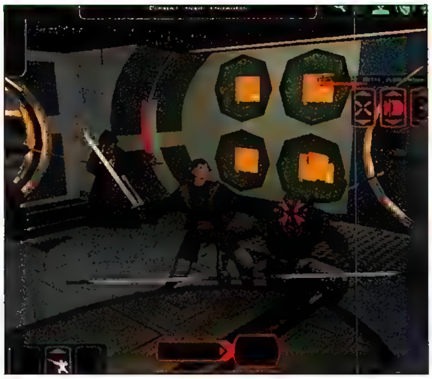
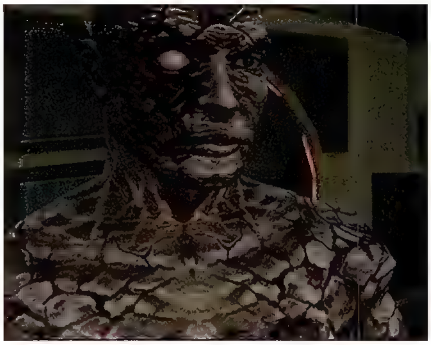
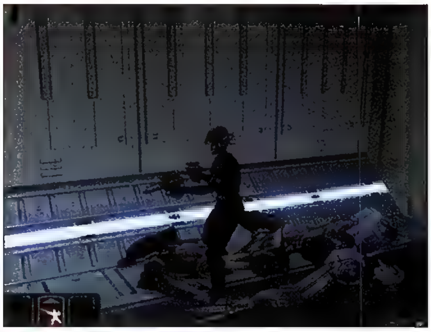


Knights of the Old Republic 2: The Sith Lords

Logan Booker can't think of an appropriately phallic lightsaber joke.







To all but the most die-hard of fans, George Lucas' famed *Star Wars* series has become something of a streaky yellow stain on the underpants of sci-fi. The prequels succeeded only in throwing Hayden Christensen's tentative career as an actor into a death-spin and providing Samuel L. Jackson with a movie where he doesn't glorify every line in the script with an uplifting profanity involving his genitalia or that of someone's mother – raising the total count of such movies to '1'.

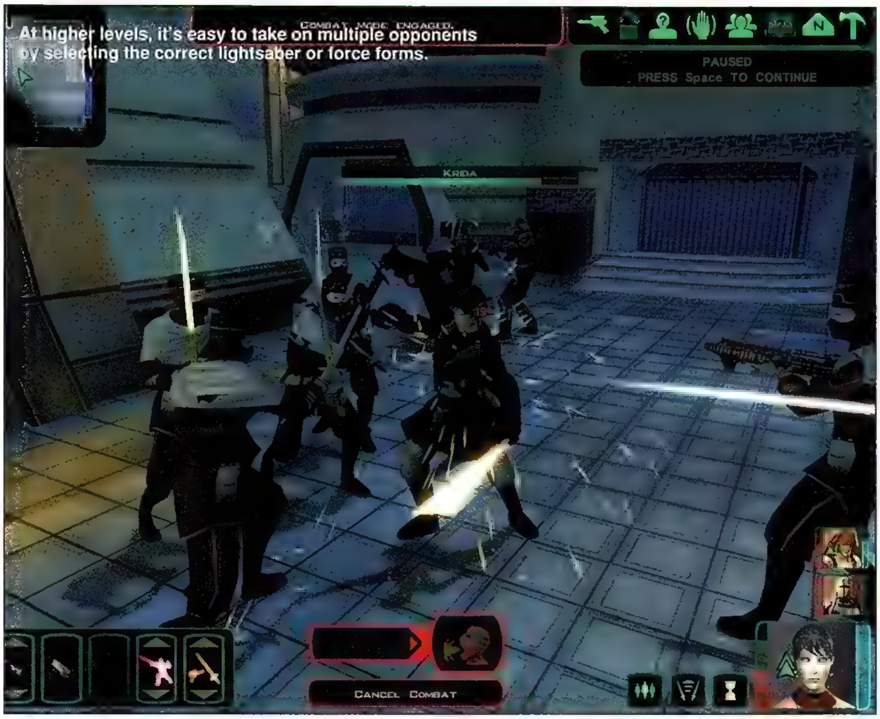
Fortunately for us, George is kept away from the game-creation process, and LucasArts has a habit of outsourcing its more complex titles to other developers. BioWare received Knights of the Old Republic 2: The Sith Lords, and it in turn passed the project onto Obsidian Entertainment, headed by Feargus Urquhart. If the name sounds familiar, it should – Urquhart was one of the creative geniuses behind Fallout. With this in mind, we've been expecting big things from KotOR 2.

The sequel takes place some five years after the original. The once-mighty Republic has fallen; the Jedi eradicated by civil war and Sith infest every square parsec of the galaxy. It is at this point you awake from a deep, drug-induced slumber, only to find yourself in a regenerative kolto tank on board a mining outpost. With no recollection of your past and a weak grip on your Jedi heritage, it's up to you to find out what's happened during your time asleep – all the while dodging Sith, homicidal droids and annoying party members.

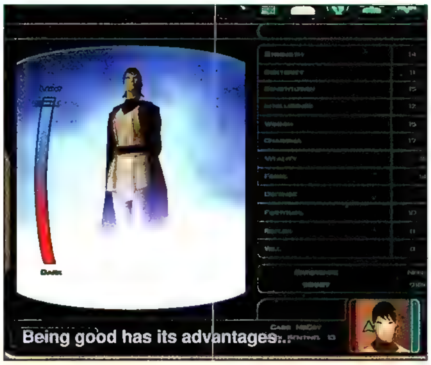
Like all of BioWare's role-playing games, KotOR 2 makes use of d20 RPG system. This involves the now-ubiquitous six stats – strength; constitution; intelligence; dexterity; wisdom and charisma – as well as skills and feats. Players can also choose from three classes – Guardian, Sentinel or Consular – and each places more or less emphasis on Force usage.

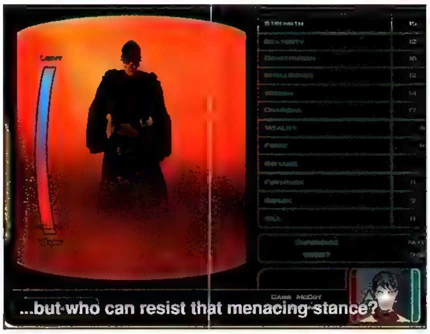
KotOR 2 uses a modified version of BioWare's Aurora engine, an OpenGL-based fossil originally developed for Neverwinter Nights. It's been updated to support some fancy pixel shader effects, as well as high resolution textures, but it does show its age in the model complexity and animation departments. Otherwise, it's very capable and

PERIPHERALS FOR THE SERIOUS GAMER JOYTECH



At higher levels, it's easy to take on multiple opponents by selecting the correct lightsaber or force forms.


Being good has its advantages...


...but who can resist that menacing stance?

handles the job of rendering environments and characters admirably. Just don't expect it to give your system much of a workout.

Combat is handled much the same way as the original – everything happens in real time however you can pause the action. Animation in combat is quite fluid and very easy on the eyes, even if female characters walk with a somewhat male swagger.

As combat is based on statistics rather than reflex, distance from your target has little effect on your chance to hit with ranged weapons.

While it's mildly annoying to watch your character constantly miss enemies less than a metre away, things improve as your skills increase and your feats augment your abilities.

While on the topic of feats, it should be noted that they mostly provide static bonuses rather than imparting special moves or providing additional options for your abilities. Although this does flesh out the feat list, static bonuses have always been considered gimpy in d20 compared to feats that gain you extra abilities, and you'll put off acquiring them over such feats.

One of the gameplay mechanics pays homage to System Shock 2. In SS2, the player could use 'nanites' to purchase items, hack consoles and use abilities. Later on in the game you could break down objects to generate nanites on demand. KotOR 2, using 'components' and 'chemicals' in place of nanites, lets the player make upgrades for their equipment and create items, such as medikits and security bypasses at appropriate places in the game. Unneeded items can be broken down to provide additional resources.

Perhaps the most hyped feature of Knights of the Old Republic 2 is the freedom it imparts on your character's moral and ethical development. The game constantly throws choices at you that influence your alignment. Being a bastard will push you closer to the dark side, while noble deeds and politeness will give you favour with the light side. Depending on how you act, not only does the game's storyline adapt, your character's appearance, and that of your party members, will change.

For all its greatness however, the game does fall a little short. There's a general feeling of roughness in some parts of the plot and characters and the environments seem a little empty and lifeless at times. The story can also drag on at certain points, and we're sure that if you looked hard enough you'd find more than a few redundant conversation trees.

Regardless, Knights of the Old Republic 2 is a great start for Obsidian and a must for fans of the original game or of BioWare's RPGs. Now we'll just have to wait and see if it does as good a job again with Neverwinter Nights 2.

> **Animation in combat is quite fluid and very easy on the eyes, even if female characters walk with a somewhat male swagger.**

PC

Developer **Obsidian Entertainment**
Website **www.obsidianent.com**

Recommended
1.8GHz CPU; 512MB RAM; 128MB OpenGL 1.4 video card.

VERDICT

✓ Light/dark side character evolution; nice combat animation; upgrade system.

✗ Aurora engine is beginning to calcify; plot and environments feel rough; story drags a bit.

score **8.5** OUT OF 10

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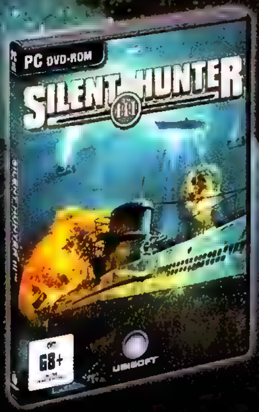

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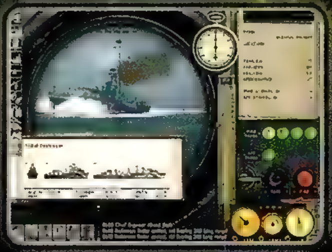

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Project: Snowblind

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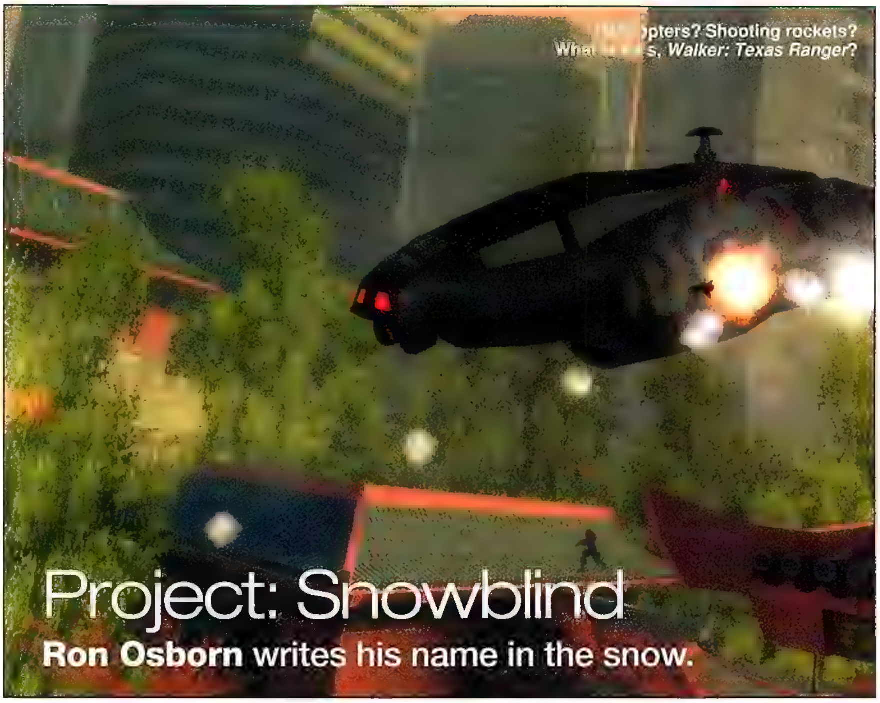


[illegible]pters? Shooting rockets? What [illegible]s, *Walker: Texas Ranger?*

The phrase 'good console FPS' can seem like an oxymoron at times, but classic titles such as GoldenEye on the N64 have proved that it can be done. While it doesn't push the envelope, Snowblind is a good example of what a console FPS should be.

You play the bio-augmented Lt. Nathan Frost, a regular soldier turned military super weapon thanks to a wounded-in-the-line-of-duty-but-saved-by-experimental-surgery story that would make Robocop blush.

Despite a clichéd story and dialogue that could have been written by a pro-wrestler, the actual game is good fun. Developer Crystal Dynamics, known for its Legacy of Kain series, has done an excellent job of appropriating the best elements of modern FPS games and tying them all into a single package.

Everything you've come to expect from a shooter is here: realistic physics, detailed environments, intelligent AI, vehicles, team work and, of course, a large variety of guns.

Levels are well designed and, despite being linear, give the impression of depth with areas to explore and alternate means of passage; though this is usually limited to the sneak approach or the gun's approach.

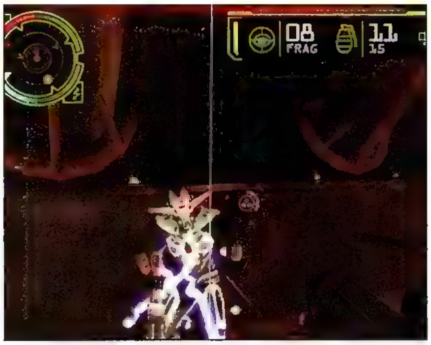
Snowblind is definitely action-oriented. Group firefights are particularly chaotic as your team spreads out to engage enemies. It gives the impression of a real battleground. Certain parts of the environment are also destructible and there's nothing quite like seeing the seemingly impenetrable wall you just ducked behind brought down by a rocket launcher.

Aside from the usual assortment of guns and grenades you also have access to various augmentations that gradually become available throughout the game. The augmentations are generally aids to combat, granting you such abilities as reflex boost, bullet shielding or invisibility.

For a game that focuses so heavily on action, the controls are relatively complex. With augmentations, primary weapons, secondary weapons and miscellaneous items to choose from, cycling through your inventory of death can be a bit of a chore.

The only other annoyance is that there is no way to record the messages you receive in-game. In the heat of battle, it's often easy to miss important instructions or tips. It would have been helpful to have a log of messages to keep track of your progress.

Though the story is hardly compelling, and the weapon selection system could use a little work, if you can get past these shortcomings then you're in for a real treat. Project: Snowblind is proof that there are still good console FPS games being made.



PS2

Developer **Crystal Dynamics**
Website **www.projectsnowblind.com**
Players **16**
Other platforms **Yes; Xbox, PC**

VERDICT

✓ **Borrows from some of the best FPS games; intense fire fights; great atmosphere.**

✗ **Switching weapons and items is a chore; banal story; dialogue is laughable.**

score **8.0** OUT OF 10

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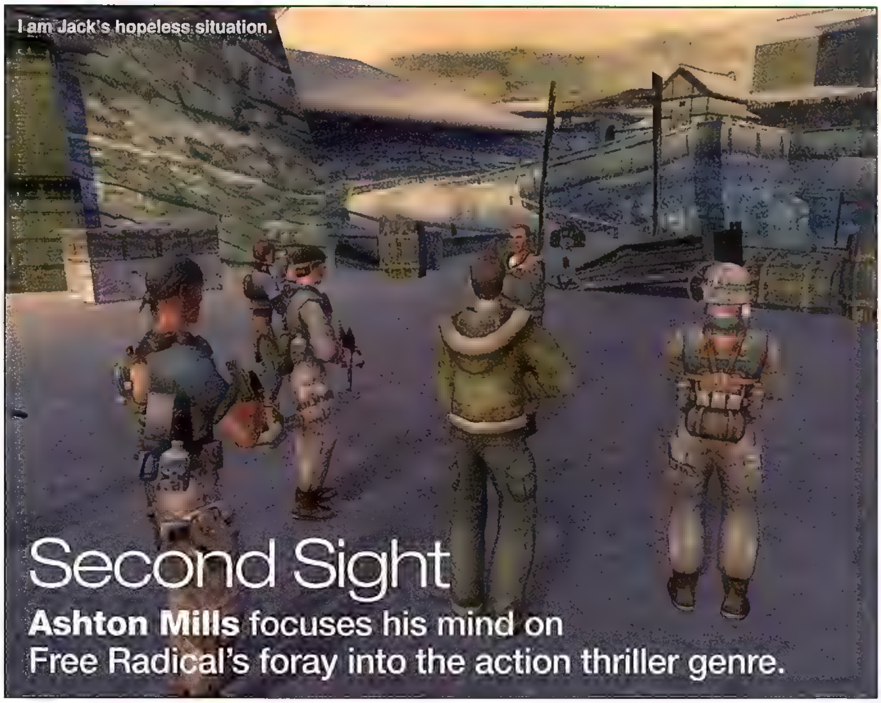


I am Jack's hopeless situation.

Second Sight

Ashton Mills focuses his mind on Free Radical's foray into the action thriller genre.

Billed as a psychological thriller, Second Sight tells the story of John Vattic, a man who wakes up to find himself in a military hospital with both amnesia and the ability to use telekinesis. It doesn't take long for the flashbacks to hit, and the irony of the situation becomes apparent when you discover that John was once a scientist who debunked such outlandish concepts.

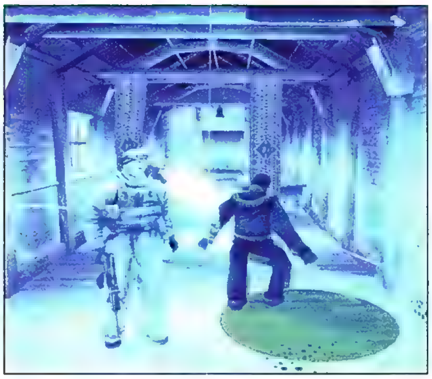
This twist is a small example of what forms a compelling story, but not only as a background. You get to play John both in the present with his new-found powers and in the past before all this came to pass. As John remembers, cutscenes unravel more of John's mysterious past, which then segue directly into the game.

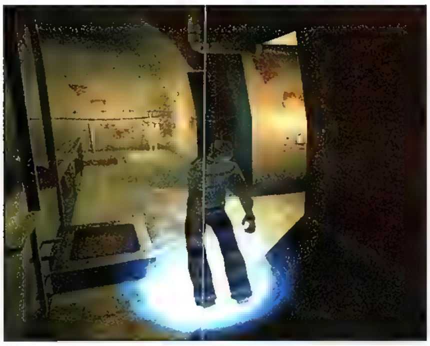
The first flashback takes you back six months to a military base where John must complete an assault course before joining a crack team of cliché tough dudes on a mission to stop a madman. The course is a nice way of introducing you to the the mechanics of the engine, and specifically on how to use walls to your advantage – much of the gameplay focuses less on brute force and more on using stealth and tactics to win your battles. Watching the pattern of guard movements for example and avoiding their path, or using walls as cover in a firefight.

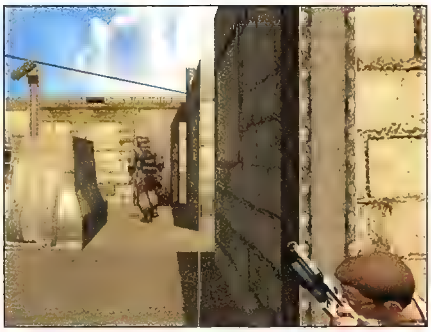
John is, like Freeman before him, a scientist with an uncanny knack for weapons, and you will find and enjoy everything from pistols and SMGs through to sniper rifles. But the real fun is John's mental powers when you're playing him in the present – telekinesis to move objects (and later people), psi attacks to mash minds, an ability to render yourself near-invisible, and even the posession of other people.

The engine uses the familiar third-person perspective with automated camera positioning. This is tricky to get right in a game, and it either works wonderfully and enhances gameplay, or it hinders it. Unfortunately, Second Sight falls into the latter and attempting to control John in a firefight near room and corridor edges is an exercise in 'Holy crap, where did everyone go?' Additionally, a bizarre auto-targeting feature for weapons often has John's viewpoint swinging to target what the game thinks is the best choice, when it's not. As a game designed for Xbox, PS2, and Gamecube it's clear the focus was on a console control system, and this lets the PC version down.

If you can push past this, though, the attention to detail and story in Second Sight is engrossing. The cutscenes are cinematic with superb model and facial animation and reasonable voice acting. Making full use of dynamic lightning, shadow and particle systems, and handling indoor and outdoor environments with finesse, it's a joy to run around in while smashing people against walls. If you're bored of the FPS deluge of late and in the mood for a more cerebal gaming experience – while still having fun – Second Sight will satisfy.







PC

Developer **Free Radical**
Website **www.codemasters.com/secondsight**

Recommended
2GHz CPU; 512MB RAM; 1GB HDD

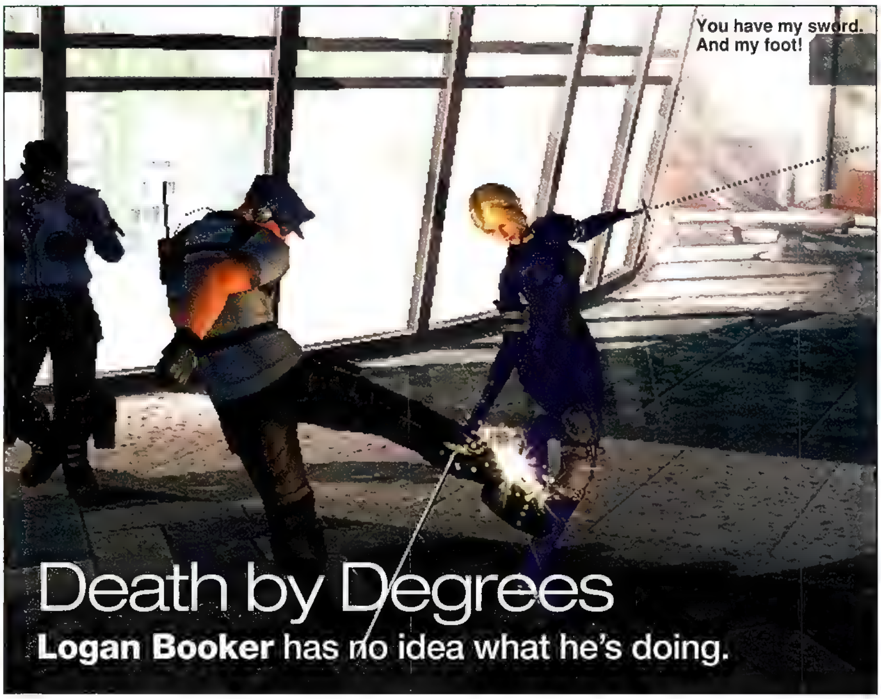
VERDICT

Innovative concept playing past and present; good story telling; neat graphics. ✓

Suffers from automated camera positioning and weapon targeting. ✗

score **7.0** OUT OF 10

PERIPHERALS FOR THE SERIOUS GAMER JOYTECH™



You have my sword. And my foot!

Death by Degrees

Logan Booker has no idea what he's doing.

Every now and then a game comes along that despite all its good intentions, has no idea what sort of game it is supposed to be. Death by Degrees is one of those games – a genre-skipping conglomerate of so many sub-modes that no game pad in existence can accommodate the required controls.

Death by Degrees however is a noble attempt at taking today's most popular games and cramming them onto a single PS2 DVD. The player controls one Nina Williams, a government assassin who has made numerous appearances in Namco's Tekken series of Streetfighter clones. The plot itself is not really explained at the outset – suffice it to say you need to kill a lot of people in the skimpiest of outfits possible.

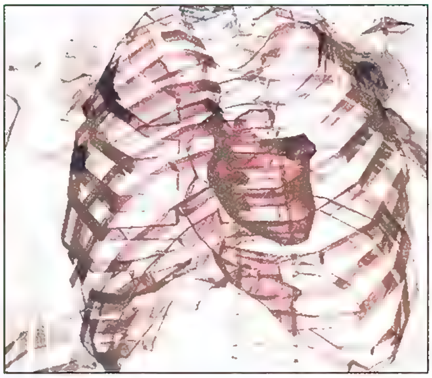
And that's the focus of the game – Nina's various costume changes. Attached to this deep and involving mechanic – much like Nina's two-piece is to her somewhat assertive cleavage – are elements of survival horror, Tekken-style combat, problem solving and even a little nod to *Romeo Must Die*.

Adopting the now customary tank-like manoeuvring found in Resident Evil, it's your job to navigate a chunkily animated Nina about her surrounds. You can interact with certain elements of your environment including objects destined to consume inventory space, fingerprint readers and assorted moronic bad guys. Combat however is handled in a very non-survival horror way, and each encounter temporarily transforms the game into a beat 'em up where you string combos together, put your opposition into sleeper holds and pummel them with special moves.

The most special of these moves involves your 'focus bar'. This bar builds up over time as you fight, and once it maxes out, Nina can perform a killing move. When executed, the game goes into an 'X-Ray' mode, allowing you to target various body parts, and is very similar to the X-ray scenes in *Romeo Must Die*. What follows is a fairly inoffensively X-ray rendered explosion of gore – a hit to the head for example shatters your enemy's skull like a cricket bat to a bowl of sugar glass.

For all its coolness, the game elements just don't gel. The sheer number of button combinations and flicks of the analog stick that the player is required to remember is overwhelming at best. The in-game menu system, which gives you access to your inventory and map is slow to navigate, and to top it all off, our attractive heroine is voiced by a woman in her mid-30s, whose gravelly tones will forever haunt the title's audience of 16-year old sex-starved gamers.

Regardless, the game isn't total crap – it just tries to do too many things at once. It's graphically rich for a PS2 title, even if the controls are tricky and the animation a little forced. Tekken fans, who for some unfathomable reason also appreciate the subtle wrestling match that is the default survival horror control system… ah, who are we kidding. Get Resident Evil 4.



PS2

Developer **Namco**
Website **deathbydegrees.namco.com**
Players **One**
Other platforms **No**

VERDICT

✓ Slick graphics; skimpily-clad female protagonist; focus bar finishing moves.

✗ Chunky animation and control scheme; tries too hard to be so many things.

score 6.0 OUT OF 10

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Further flat screens

Is it possible to use an LCD TV as both a TV and a computer monitor? I'm hoping to invest in this idea for power savings, saving space, and displaying higher resolutions while watching DVDs through the video card's TV-out function or standalone DVD player.

Steve

Yes, it's possible; there are many models of LCD TV that have VGA ('RGBHV') inputs. Because they're TVs, though, they typically have unexciting resolution specs compared with PC monitors; they only need HDTV pixel counts, at most, so something like 1366 by 768 pixels is about all you can expect from an 80cm-ish widescreen unit. Which won't be cheap.

LCD TVs are getting better, as long as you don't want a huge one. The new Sony KLV-S23A10 is a 23 inch 1920 by 1080 widescreen with a PC input that lists for a mere US$1300.

Basic 4:3 aspect ration non-HD LCD TVs can only be expected to deliver 640 by 480, and seldom have computer input.

Old school, yo

I'm wondering whether you know of a way to get Amiga disk images back from PC to Amiga (as you know PC 3.5in double density disks are 720KB, Amiga is 880KB). I have DOS-2-DOS, but that's Amiga reading DOS disks, which are too small to fit the Amiga data on.

I tried making a cable and software to transfer the files using the parallel port, and the printer 'ready/not so ready' line to pulse the data, but I forgot I was interfacing with a Windows platform. You may ask, why not use a good emulator? Because PC joysticks suck – always have, always will.

Also, my mate and I play Bubble Bobble every other weekend (with Action Replay – love the free lives!), and the disk farked right up, no recovery possible, and I'm beating him 3-2, which I guess is a main factor for wanting to transfer the data.

Sean

Um... multi-volume Zip/LZH/whatever archives? Alternatively, a high density Amiga drive would probably solve the problem, and wouldn't cost you much, but good luck finding one in eBay's Vintage category. More expensively, a CD-ROM drive for the Amiga would do the trick nicely. Old SCSI drive (not so old that it can't read CD-Rs...), old SCSI controller for the Amiga, away you go. Easier to find than the big floppy, and more useful.

Oh, and is there some reason I've forgotten why a null modem cable and terminal programs were out of the question? That'd only take a couple of minutes per disk image, tops. People did some hacking on the old Amiga ParNet parallel port file transfer system (for which I still have a cable) to make it PC-compatible, too, but that was back in the days of DOS, and you don't need the speed for files this size anyway.

Regarding PC joysticks sucking – they do? Well what about **www.slikstik.com**, **www.x-arcade.com** and, for Australians in particular, **home.iprimus.com.au/ozstick/index.html**?

Given hardware like that, emulation ain't that bad an idea, if you're willing to buy some extra gear. UAE (**www.winuae.net** for the Windows port) is apparently decently game-capable these days.

Regarding the feeding of your addiction to Bub and Bob, one might suggest MAME and the real live arcade Bubble Bobble ROM, which my psychic powers tell me zips down to only about 178k. But that would of course not be legal, unless you already owned the physical ROMs.

IOOTM wins a Logitech MX510!

It's a mouse. You do mouse-related things with it. Like jogging. Or mousing even.

Hairy heat sinks

Heat sink performance depends on surface area, right? Wouldn't it improve a copper cooler if you electrically deposited copper onto it, from copper sulfate solution or something? That way the copper would grow on in lumpy crystalline dendrites, which must have higher surface area.

Bennett

It's not just surface area; it's the ability to move heat from that surface to your coolant – in this case, air. In normal manufacturing scales – things you can cut or extrude – ridging up the surface, or putting pins on it will improve the ability

You know you want it.

I/O OF THE MONTH

Big beefy pixels

I have a Panasonic TH-42PA20 plasma TV, and want to hook it up to my PC so I can play games on the big screen with 5.1 sound. But I only have a RADEON 9200. So I need a new graphics card.

As the resolution of my TV is only 852 x 480, do I only need to buy a 9600XT and play games at the lower resolution (with highest detail, highest antialiasing etc) and spend the savings on a better processor and more RAM?

Or would you recommend I buy something like an X800, and just let the TV down-convert the high resolutions to 852 x 480? I've currently got an Athlon XP 2000+ and 768MB RAM.

Robert Ruecroft

Your plasma TV, like a lot of other current plasmas, will indeed accept a range of computer inputs, and automatically scale them to match its own resolution. That's quite a step forward in itself; fancy giant TVs with enough resolution to display some kind of computer image have traditionally had strict input scan rate restrictions, often accepting only one input resolution and refresh rate, which made it basically impossible to drive them with a normal PC.

But, as you say, your 'Enhanced Definition Television' (EDTV) plasma only actually has 852 x 480 pixels. That's an excellent match for DVD and rather better than most regular TVs can manage, but it's still piddly by conventional computer standards.

There's another piece of the puzzle – refresh rate. Your screen accepts a wide range of horizontal scan and refresh rates, and like an LCD monitor it doesn't flicker. But also like an LCD, it still has its own hard refresh rate.

This refresh rate puts a cap on the maximum frame rate you can actually display. Go higher than the real screen update rate and you may just get 'tearing' or get a sequence of whole frames capped at the update frame rate. It depends on how the plasma's video preprocessor works.

Panasonic doesn't publish an update rate specification for the 42PA20, but if it's higher than 75Hz, I'll eat my hat. Since this isn't a high-end plasma, it may only be 60Hz.

What all this means is that any graphics card that can manage full eye candy at 852 x 480 and 75Hz, in your games of choice, will look as good on your plasma screen as anything can.

If you have trouble setting that exact resolution, then a higher 16:9 resolution will work as well, and you'll probably be able to keep the frame rate up by disabling FSAA, since the plasma's resolution scaler will have a similar effect anyway.

A RADEON 9600 would be more than capable, but doesn't support the fancy shader effects in recent games. A plain GeForce 6600 would do the job better. A GeForce 6200 or RADEON X300 will manage it, too, but those are only available in PCI-E. And I'd definitely get the video card before considering any other upgrades; your current CPU may turn out to be perfectly adequate.

of the heat sink to move heat to the coolant. On very small scales, though, things get trickier. Fluid flow over small-scale uneven surfaces can be peculiar – which is why sharks, whose skin is covered with tiny toothy scales, experience less water friction than they would if they were smoother. Micro-turbulence in the water stays in the grooves, if it can, and acts like a bunch of tiny liquid rollers between the shark and the main body of water, with little mixing (and thus little heat transfer, as well as little friction).

Tiny-scale unevenness on a heat sink might well work the same way, causing fluid flow oddities that'd make the sink work worse, or at least no better, than it did before.

Bit-box wanted

In these days of sliced bread, not to mention self-tapping screws, one would think that by now, the masses could attain storage nirvana with a cheap NAS. But it seems that 'cheap' and 'NAS' are seldom used in the same sentence. So, rather than selling an organ to finance an out of the box solution, I started looking for a do-it-yourself setup and found this: **www.rebyte.com**

Looks like a pretty neat idea, and not particularly expensive. Do you have any experience with these things? Is there a cheaper way to the holy grail of reliable mass storage?

Garry

The reByte embedded Linux boot card is indeed neat, but it's limited by the reliability of the computer in which it's installed. If you're repurposing an old machine (probably with a fresh drive or two), some part of it may be on the way out.

And yes, there is a cheaper way – as long as all you want is your basic NAS gadget, not extra auto-backup stuff thrown in. You can, of course, add auto-backup in various ways yourself once your NAS device is working.

Check out Linksys' NSLU2, which is a plug-and-go Linux-based appliance that accepts one or two USB external drives and turns them into SMB shares, poof, like that. It's quite hackable, too: **www.gideontech.com/content/articles/264/1**.

Personally, I'd like to see a thing like this that allowed you to run more drives – through a hub, even – but a couple of non-RAIDed 250GB drives will do for most people for the time being, and the NSLU2 makes that possible.

It sells for about $US100, not including hard drives, though there are likely cheaper versions out there.

Network storage does not, at the moment, get much simpler than this.

Freedom!

You can only enter once per competition or you'll be disqualified. You must provide a postal address and phone number for prize delivery when you enter (not a PO Box).

50 x Entry to an exclusive Microsoft Doom 3 party for students!

It's good to be special. You know you're special when you get to do something no one else does. Such as wearing a Tutu in public, or getting married at Paintball, or simply being an *Atomic* reader. You're also special if you get to be one of the select few who'll visit Microsoft HQ in Sydney for the sole purpose of playing Doom 3 on the Xbox before anyone else!

That's right, the Big Cheese of software companies has teamed up with Activision and wants *you* to come and visit the Microsoft offices for a night of competitive multiplayer gaming, Xboxing, and hardcore partying. Not only that, but food and drinks will be on hand, as well as Microsoft personnel to do your every bidding! OK OK, we can't guarantee the last bit, but the rest is for real. Better than this, the winner of on the evening will receive a prize pack courtesy of Activision valued at $500!

See **www.atomicmpc.com.au/xboxparty** to enter.

2 x Logitech MX-1000 laser cordless mouse

Yikes. It's true that some mice fetishists find the smooth curves of a mouse appealing. It's even true that the more ergonomically designed mice are able to illict 'oohs' and 'ahhs' from the connoisseurs who appreciate finely crafted X-Y position indicators for a display device. And it's true, really, that there are those who will spare no dollar on getting the absolute pinnacle of sleek, sexy, and streamlined mice with which to game, browse, and ultimately reach the highest of pleasurable plateaus. And there is none so refined a mouse as the sports car Rolls Royce of mice in Logitech's MX-1000!

But why fork out precious cash to buy one of these soft and sensual babies? Thanks to Logitech, right here and right now, you can win one for yourself *free* by simply answering the following question and then you, too, can experience the ultimate in tactile happiness!

Q **What chip does the MX-1000 use to deliver its highly accurate goodness?**

1 x Williams F1 Wheel for PS2

There is nothing, *nothing* as cool as the ultimate in steering wheel attachment-ness. It's like there are various levels of cool, with the Fonz at the top and this Williams F1 Wheel for the PS2 coming in a close second! This is the type of device you can show to potential partners of the opposite sex and have them become putty in your hands. *And* you get to play your racing sims in style. At the same time, even. Complete with all the controls you'll ever need, and built in with force-feedback loving, this is the premiere driving wheel bar none. Thanks to Joytech for providing this fantastic prize available for your winnage!

Q **Who is the Australian driver new to the BMW-Williams team this year?**

Email entries to **win@atomicmpc.com.au** or post them to: Atomic, 52 Victoria St, McMahons Point, NSW 2060. Please send a separate entry for each competition. Please ensure the competition name is the subject of the email, or is displayed clearly on the front of the envelope. The closing date for entries is 20 April 2005. Winners will be announced in *Atomic 53*.

Atomic 49 winners: 3 x Xcom Lubic Cases Q. Who created the X-Com series of games? A. Julian Gollop C. Wilson, Palmerston North, NZ. K. McKenzie, Bayswater, WA. K. Brady, Maroubra, NSW. 3 x Microsoft Xbox Consoles Q. Which company recently teamed up with Microsoft to develop the graphics chip for the next -generation Xbox? A. ATI. R. Hewett, Alice Springs, NT. M. Bell, Alderley, Qld. J. Fajardo, Fairfield West, NSW. 1 x KC31U2/KC31 combo external drive Q. What does the acronym 'OLED' stand for? A. Organic Light Emitting Diode. P. Gasselstorfer, Hamersley, WA.

Terms and Conditions of Entry. 1. The promoter is Haymarket Media of 52 Victoria Street, McMahons Point, NSW 2060. Promotion period is from 9.00am on 16.03.05 until 12.00pm on 20.04.05. 2. Entry is open to residents of Australia and New Zealand. Management and employees of Haymarket Media and their immediate families, and any advertising, marketing or promotional firms associated with this promotion are not eligible to enter. 3. Enter by posting or emailing forms to Haymarket Media. 4. The draw will be held at the offices of Haymarket Media at 5.00pm on 20.04.05. Winners will be notified by mail and published in *Atomic* 53. The prizes are not transferable or exchangeable. 6. The judges' decision is final and no correspondence will be entered into. 7. The promoter reserves the right to publish the winner's name and suburb for promotional purposes. 8. All entries will become the property of Haymarket Media.

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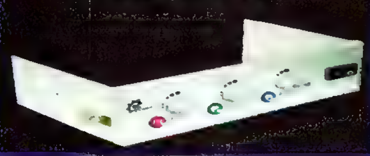

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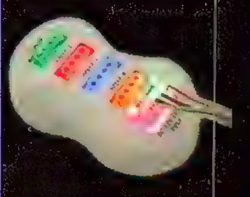
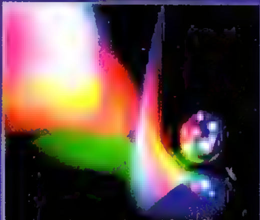


Night Magic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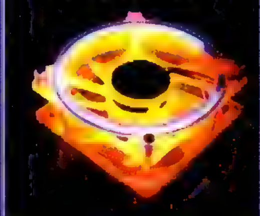

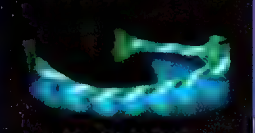
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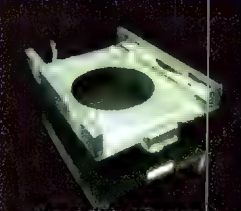
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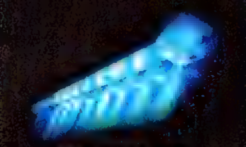
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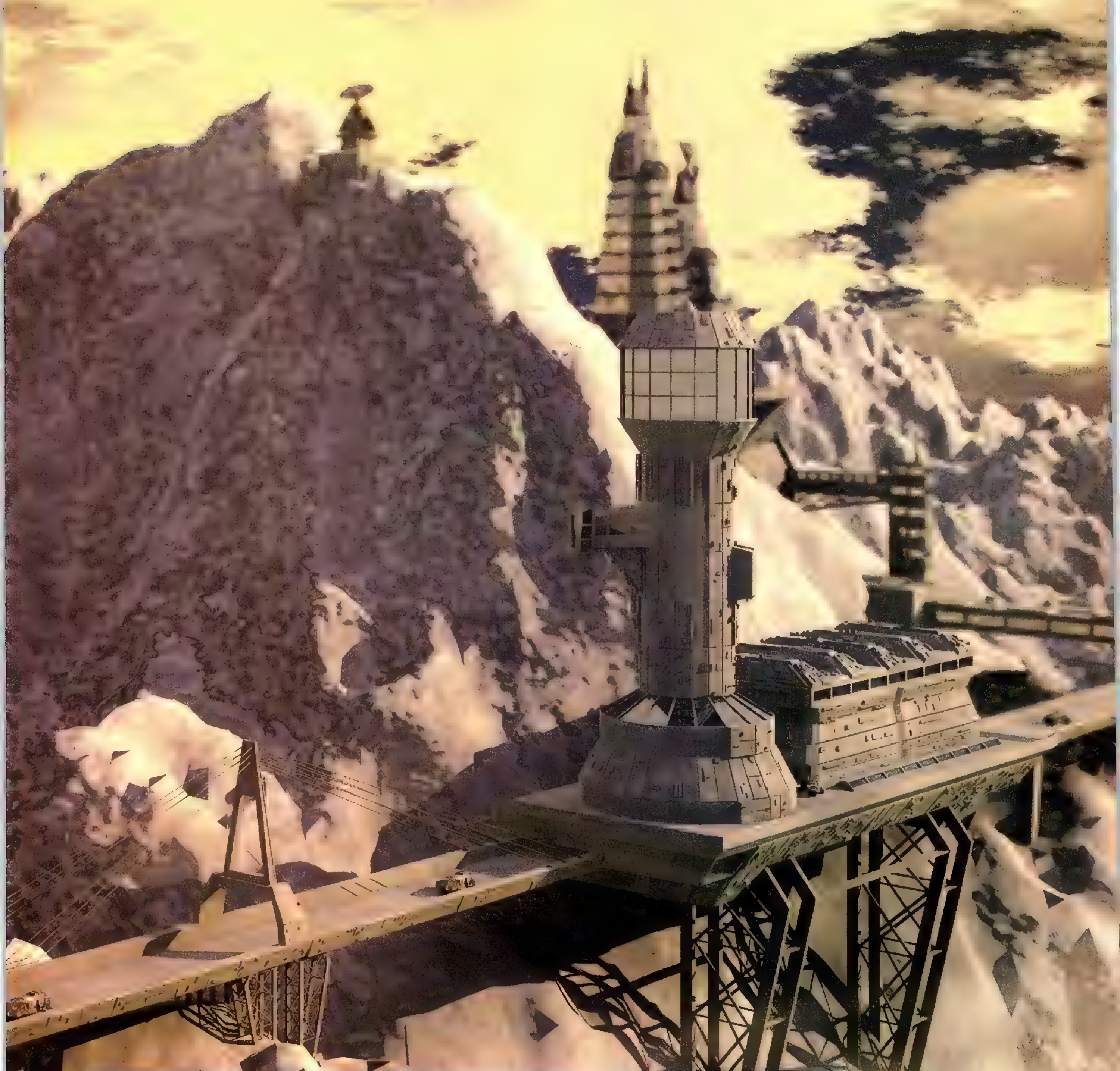
artomic of the **month**



WIN! $1995 Combustion 3!

'Snowscape' - "I always wanted to make an image that incorporated the following elements: mountains, snow and architecture. This scenery could appear in a game. I used 3D Studio Max & Combustion." - *Alain Hanni*

Congratulations Alain! Create the winning Artomic and win the latest version of Combustion, valued at **$1995**, from **discreet**! Email a preview of your masterpiece to:

artomic@atomicmpc.com.au

Welcome to the Hotbox page! Each month we feature the winning Hotbox of the Month as voted for online at **www.atomicmpc.com.au/hotbox.asp**. Not only do the winners get to show off their box in full glory for all to see on this page, but they also win an nForce3 based deluxe motherboard courtesy of Biostar!

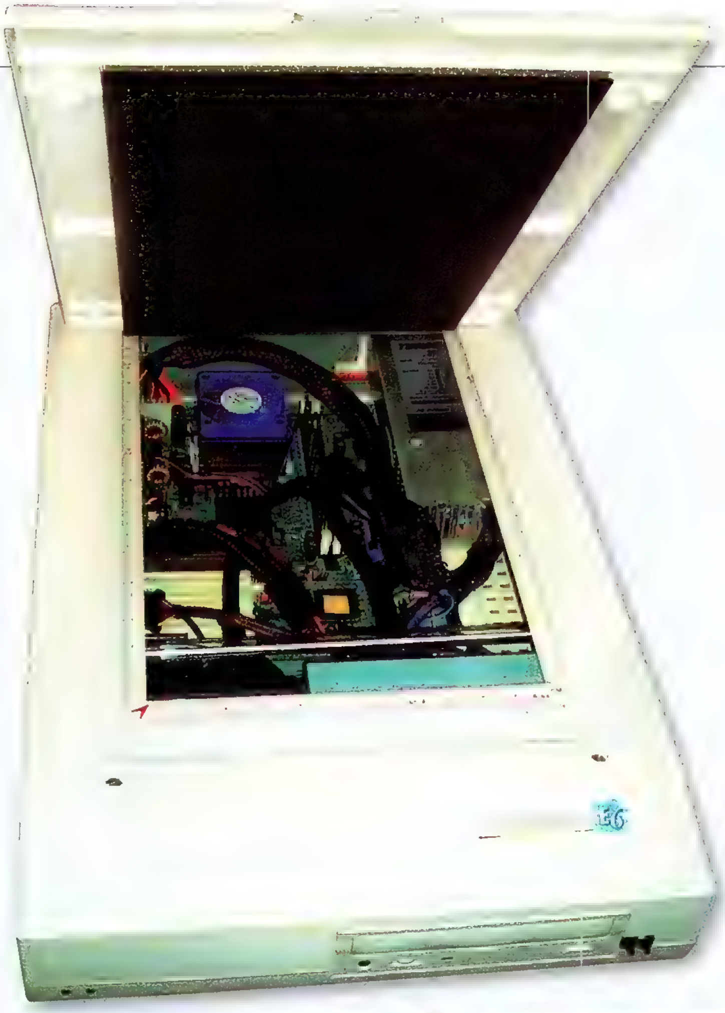
Mark's Scanner Box

This was my first scanner, way back in 1997. 'Scuzzy' interface, through an IDE 'add-on' card, it cost me $300! Within a year, it was outdated, and replaced shortly thereafter with a new parrallel port pass-through scanner. For whatever reason, I held onto this old dinosaur, and when I saw my buddy Chris doing some of his wild custom modifications, I just had to try one of my own. If you're going to make a first custom mod, might as well start big, and scanners don't get much bigger than this old behometh! What I wanted was something that would be a fully functional computer mod, capable of normal day to day computer tasks, that would look as much like a scanner from the outside as possible. Of course, that's nearly impossible from every angle, but I'm fairly happy with the results. There's still a few little touches to finish!

Mark

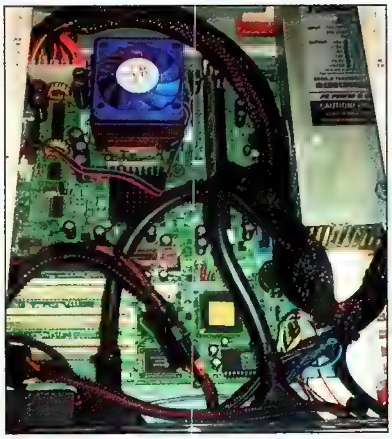
Fame, fortune, and free stuff can be yours! Send your Hotbox to hotbox@atomicmpc.com.au and include the following:

- 3-4 high resolution, well lit, pictures
- A 250 word description of how you made it, the obstacles you overcame, the tools you used, and your inspiration.
- A detailed list of the machine's specs.



technicaldetails

- Biostar M7VIQ socket A motherboard
- AMD XP1700+ CPU
- Thermaltake Volcano 10+ heatsink
- 256MB PC2100 DDR RAM
- Maxtor 30GB 7200RPM hard drive
- Lite-On 52x24x52 cdrw
- Turbo-Cool 200w rack 1-U power supply
- Black rounded IDE cables, black mesh cable wrap, black molex connectors, and a 12" atx connector extension cable
- Pair of 50mm fans & grills for exhausting hot air
- 12" white CCFL to simulate scanner light bar
- Mobo tray, power & HDD LEDs, power & reset switches were scavenged from an old case.



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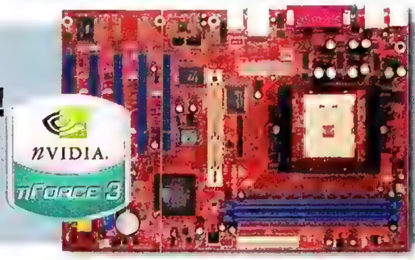

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Trivial Geek Questions

Angus Kidman leads the penguin to party!

Welcome to Trivial Geek Questions, the advice column that tackles all those bizarre queries that tend to pop into your head that aren't amenable to a quick Google search.

Ask, and TGQ will expend ridiculous amounts of effort to find out for you. Submit your questions to **tgq@atomicmpc.com.au** or via the Atomic website.

Q: My 30th birthday is coming up soon, and I'd like to make it an event that none of my friends will forget in a hurry. How much would Linus Torvalds charge to come along and enliven the evening with his presence?

The irresistible smile of open source.

The idea of getting celebrities to pop up at birthday parties isn't a new one. Many a pop star or actor has gladly accepted a handy cash payment in order to hang out at a private function. In one recent and utterly ludicrous example, Geri 'Ginger Spice' Halliwell accepted £500,000 – about AU$1.2 million at the current exchange rate – simply to attend a charity opera evening with billionaire Dickie Lugner. (He reportedly later complained that he didn't get his money's worth and that Haliwell got lost on the way to the toilet.)

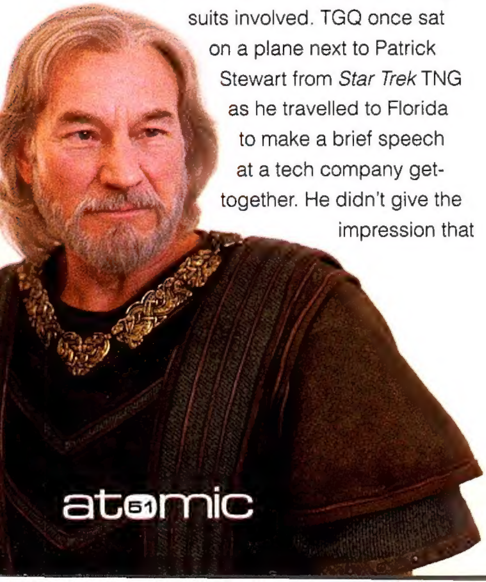
> **The best one we had was "Reptile Lady", who had some cool lizards – but a geek theme sounds a bit too sad for words.**

More musically credible acts such as Robbie Williams, Sting and the B-52s have also been known to do the occasional corporate gig, which is essentially the same idea but with more musicians and people wearing suits involved. TGQ once sat on a plane next to Patrick Stewart from *Star Trek* TNG as he travelled to Florida to make a brief speech at a tech company get-together. He didn't give the impression that this was going to be a landmark event in his distinguished career, but equally he hadn't turned down the first-class seating. In short, money talks.

Sadly for you, the man who created the original Linux kernel isn't so easily led astray by filthy lucre. When we put the question of what he would charge for a birthday party appearance directly to the great Mr Torvalds himself, he replied: 'Hey, I attend people's birthday parties all the time, and I don't charge a cent for it – but you probably mean somebody other than a friend, or, as the case is most often, a friend of one of my kids if it isn't a drop-off party.'

So what would be the figure for a more commercial celebration? 'I don't think you can pay me enough,' Linus said. 'We have theme birthday parties too – the best one we had was "Reptile Lady", who had some cool snakes and lizards – but a geek theme sounds a bit too sad for words.'

So it doesn't look like Linus will be rocking along to your shindig, but that doesn't mean you can't still have something of a Linux theme to the whole event. If it's the middle of winter, suggest that everyone wears penguin suits. Imbibe copious quantities of beer, Linus' favourite beverage. And if all else fails, Reptile Lady is probably still available.


'For the sake of the future of all mankind, I will have a small Sprite.'

atomican

www.atomicmpc.com.au

At the time of *Atomic*'s launch, few could have dreamed its online offshoot would be anything more than an adjunct to the publication. Yet today, as one of Australia's most popular e-communities, it's hard to imagine *Atomic* without its forums.

Rivals wonder what catalysed *Atomic*'s online explosion. Reading through the archives, three characteristics stand out:

First, there's the genuine joy of geeks connecting with other geeks. Second, there's the dialogue between the online community and the nascent magazine's writers. And third, there's the quality of technical advice being freely exchanged by some of the country's – nay, the world's – finest hardware hackers.

It was such potent chemistry that it *almost* went into meltdown.

One of those surprised by the forums' burgeoning popularity was their administrator, Evil Admin. In an act of geek heroism, he had eschewed off-the-shelf software and hand-coded the forums from scratch. But how could he have known the Herculean load his brainchild would eventually need to bear.

As the community grew, the forum code began to groan. Double posts. Server timeouts. Random reboots. Cryptic SQL errors. And so it was that, quietly at first, then ever more loudly, the community chant rang out... *'v2! v2! v2!'*

The Royal Society for the Prevention of Cruelty to Servers expressed concern... *'V2! V2! V2!'*

Atomicans with pitchforks and flaming torches began to encircle the *Atomic* offices... ***'V2! V2! V2!'***

And then suddenly, one Spring morning after the long cold months of suffering, it arrived... the *Atomic* Forums VeeToo.

Unfortunately, it wasn't *quite* what the community had expected... (**www.atomicmpc.com.au/v2**)

(to be continued...)

Virtuoso

potm

It's a stinking hot Aussie summer day, and on centre court Mac Dude is already armed up and limber.

Focussed and fact-of-the-matter tennis commentary, featuring Bec Cartwright. What's not to love? ricee007, if you can't see the tennis....

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=55908

POTM is proudly sponsored by Logitech, and Mac Dude's new MX510.

Salted peanuts

Luke Anderson sniffs out the opposition.

Running a LAN is a lot like eating salted peanuts. They're yummy and enjoyable, but too much and you end up with a mouth like sandpaper. This is as unrelated an example as I can possibly get to the topic of LAN management, but there it is.

The message here is that running a big LAN isn't as easy it first appears. Sure there are costs, security, and breakages to worry about, as well as power bills of Chernobyl magnitude to consider. However, perhaps the greatest problem of organising LANs is the sometimes problematic personal and impersonal hygiene levels of some its attendees.

Now granted, in my time, I've sat around for weeks without having a shower, and while I noticed cheese growing in odd places and stunk so bad that even the rats would steer clear of me, I at least wasn't going outside and sharing it with the world!

For some reason, many gamers believe their unwashed bodily odors to be the sweetest of floral scents, and that it should probably be bottled and sold so that men everywhere could smell like festering goat hair. As if you could go to the perfume section of Myers and buy 'Eau de U8eRl337' to impress the girlfriend.

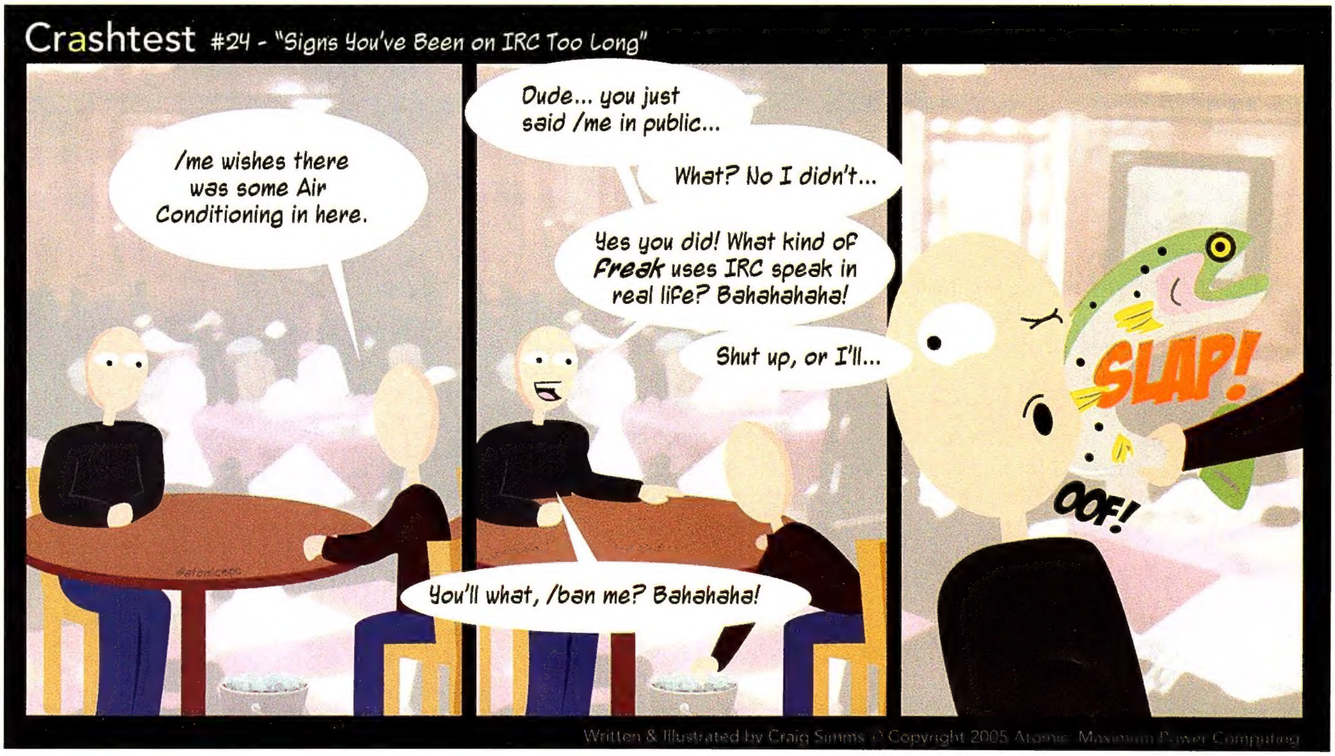
So what's a manager to do when these chaps show up at your LAN? A wise man, with a long white beard and carrying an imposing staff, once said 'prevention is better than cure, arr!'. There are steps LAN organisers can take to ensure that hygienically challenged gamers don't enter the premises in the first place: stench bouncers placed at the door can weed out those that choose a life without soap. Another possible tactic is to construct a wind tunnel through the main gaming area using a variety of pedestal and desktop fans. The concept works much like a good fan cooling system for your case, so you'll need both intake and outtake fans. It helps to seat the smellier people towards the 'outtake end' of such a wind tunnel.

Alternatively, the enterprising young LAN organiser can provide free deodorant to all attendees, and run tutorial classes on its application to the body for those who so far haven't come in contact with it before. Make sure the deodorant has no scent though, else you may give off the wrong message when certain people walk past your venue and see a room predominantly full of sweet smelling men. Female gamers on the other hand do not stem from the same stenchy branch as the male of the species. They are usually clean, neat and always toilet trained.

Once the LAN is in full swing however it will be hard to enforce a minimum hygiene standard. The following tips, placed on a white board, should remind attendees of their responsibilities:

- Bring a spare shirt. It can't hurt. Plus if you spill something on yourself, you don't have to lick it off and spend the rest of the time feeling all manky.
- Turning your clothes inside-out is not the same as placing them in a washing machine... and like, washing them.
- Keep your shoes on. I don't care if you can't feel your feet anymore.
- Brush your teeth. In fact, shower before you come. Think of it as a hot date except without the girl. Wow that's kind of depressing.
- Put garbage into a garbage bin. Throwing it around or leaving it to evolve might seem like cool beans at the start. But it's not. It makes you smelly.

And that's pretty much it. Remember kids, cleanliess is next to 1337ness!


Crashtest #24 - "Signs You've Been on IRC Too Long"
/me wishes there was some Air Conditioning in here.
Dude... you just said /me in public...
What? No I didn't...
Yes you did! What kind of *Freak* uses IRC speak in real life? Bahahahaha!
Shut up, or I'll...
You'll what, /ban me? Bahahaha!
SLAP!
OOF!

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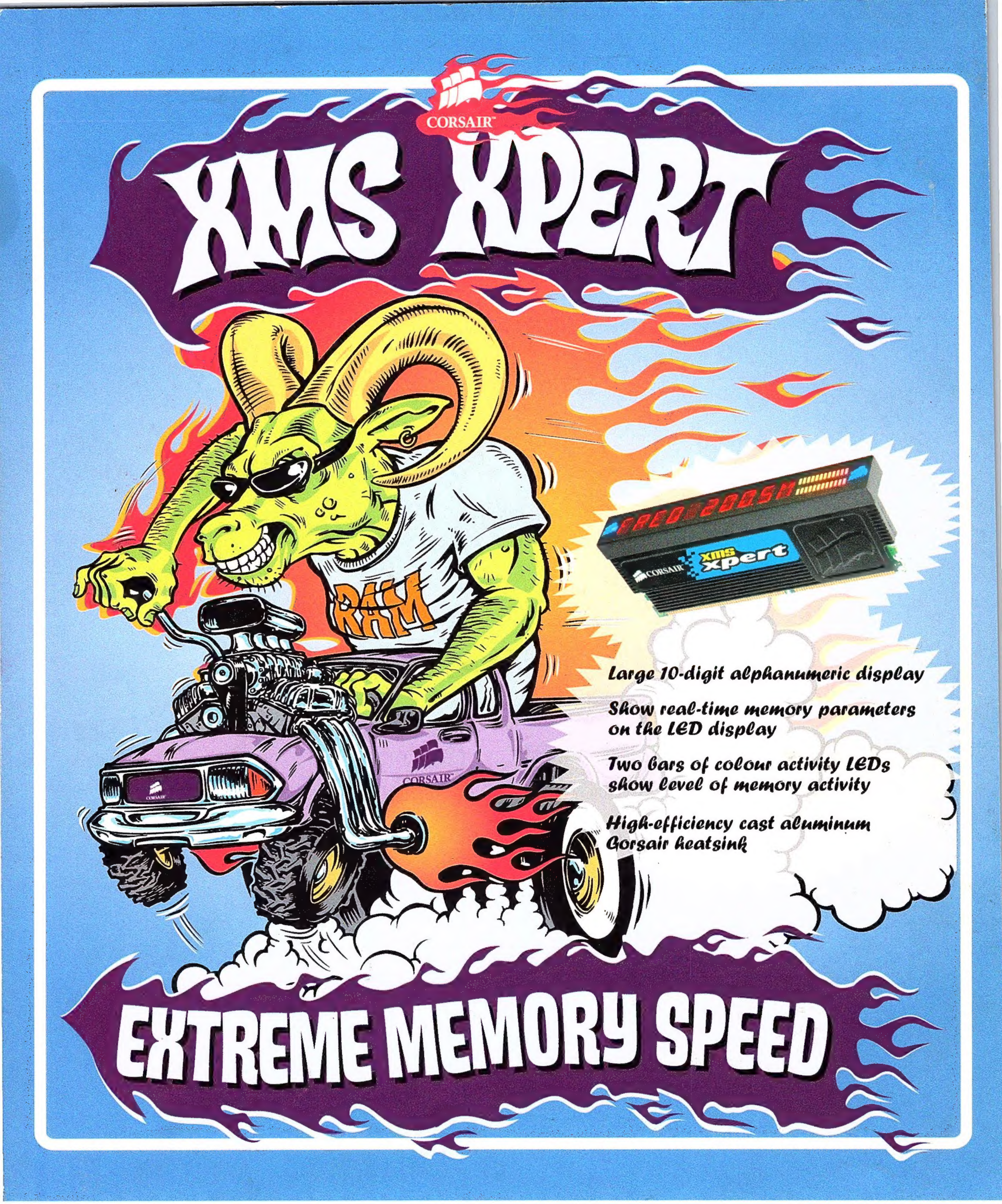
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